RAILROAD GAZETTE

FRIDAY, OCTOBER 24.

Contributions.

Impressions of European Railroads.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The American Engineer who has been accustomed to read the *Railroad Gazette* and other technical journals with attention, is surprised when he goes abroad, at finding almost everything pertaining to railways which he sees, very familiar; he is not struck by the novelty of anything; for those journals have given us a wider survey by means of the many eyes which they employ, than will be attained by any single pair of optics.

Nevertheless, I will recall for your readers some of the more vivid impressions made upon my mind by riding in daylight, and in a receptive state, over some of the principal roads in England, France, Italy, Germany, Switzerland and Holland.

The condition of the road-bed is, of course, the first thing one would notice. The drainage is everywhere better than our average; but we have some specimens, as the Pennsylvania Railroad between New York and Philadelphia, for example, equal to any which I saw. I thought the road-bed on the Continent generally better than it was in England. Very clean gravel or fine broken stone is used for ballast everywhere. I saw no poor ballast, as we have so often, although we suffer from heavy freezing, and in the parts of countries to which I refer frost is scarcely known.

In Germany and France, and, so far as I saw, to a less extent in England, iron sleepers are being employed for renewals; the form being that of our common cross-tie, with the bottom removed and the insides scooped out.

The slopes of all cuttings where any washing could occur are protected by surface ditches, which are paved and cemented. In soils that would wash easily, the whole slope is paved, and frequently all joints between the stones are filled with cement. Over a distance of 500 miles along the coast of the Mediterranean, I did not see any slope in an earth cutting which was not so protected, no matter how high up the side of the mountain it might extend. At places where falling earth or rocks could possibly reach the roadway, thick walls were raised, leaving an ample pit between them and the slope to catch all that might come down. In Switzerland, stout grillages made of old railroad bars and heavy timbers were built above the track, at exposed points, to catch any accidental avalanches. I did not see one place upon any of the lines which I traversed where a sleepy watchman could, by his neglect, cause a train accident.

Embankments upon steep side hills are avoided by tunneling, or they are protected by heavy walls on the lower side, or a viaduct is built instead of an embankment.

Borrow-pits are generally so finished with good drainage and rounded slopes that the land is useful again for raising crops; they are rarely left to deform the face of the country, as they generally do here. The bottoms of the ditches are utilized for plantations of willows, for not a square foot of land can be spared—it must produce something.

Trees, except in the parks, are not for ornament, but only fuel-producers: the high growing kinds have their limbs lopped off as fast as they grow to be two or three inches in diameter; the shorter kinds are headed in, and the limbs are cut away at regular intervals. The very smallest twigs are saved for kindlings. The cutting is done with a large pruning-knife, and the scars on the stumps are carefully smoothed; the exactness with which the wood is finally cut to length is remarkable, not more than an eighth of an inch of difference between the longest and shortest stick in a pile.

On the Continent there are very few fences; and rarely any houses scattered along the highways, as with us and as in England. All the houses are "raked up into villages," as a Yankee friend expressed it—the villages at intervals of from two to three miles.

The railway stations are better than they are with us for similar towns, exception being made of parts of Switzerland and of Italy, where they have copied our cheapest wooden country stations. Generally the station buildings are of stone or brick, with glazed roofs over the tracks at places of any importance. The station floors are of a coarse mosaic, or of encaustic tiles, or of hard wood: the best, of oak, laid in simple, handsome patterns, and kept well polished. The pieces of oak never exceed two feet in length by four or five inches wide. The simplest pattern, a very pretty one, we should call herring-bone, they call it *Pointe de Hongrie*. These short pieces of oak do not warp nor crack; they are easily replaced where they wear out, and make a superior floor for public rooms.

At all stations except the very smallest there are excellent refreshments, always good bread, good butter, a tenderloin of beef, and the wine of the country, all ready to be eaten and drunk on the premises, or to be taken into the train.

In Germany and Switzerland the second-class waiting rooms are furnished with tables, at which people are always eating and drinking, and they have beer as well as wine. This arrangement seemed to me much pleasanter for the traveler than to find eatables at rare and distant intervals, as with us. The food was better than it averages in the United States.

The most admirable features of the European stations are the water-closets or *cabinets*. Of these there are always some for each sex which are free; and adjacent to them are others, for the use of which the charge is two cents, which are kept in the most perfect condition, furnished with paper and with a wash-basin and towel. They are presided over by neat old women.

The accommodations for freight in Germany and Switzerland are similar to those in America; in England, France and Italy they make much use of transfer-tables and turn-tables for placing the cars where they are required. The small cars are very well adapted to this mode of handling, and are by no means contemptible when so used; for it is often handy to be able to run them off at any angle to a distant warehouse.

As land becomes more valuable with us we shall doubtless use similar devices, proportioned to our loads and operated by power, to save the room occupied by long curved tracks. All stations, except the smallest, are supplied with cranes for handling heavy articles in loading and unloading the cars.

The European railway carriage is commonly borne by six wheels, is divided into five compartments, with doors at the sides, the seats fixed and facing each other. The compartments in any carriage may be all of one class, or frequently of three classes. Those furnished as first-class are for eight persons each; those furnished less elegantly, for second and third classes, are for ten persons. The compartments are seldom full; and I found that there were more empty seats, on the average, than we have with us. In England, smoking is permitted, as with us, only in certain compartments reserved for smokers; on the Continent, smoking is allowed wherever not expressly prohibited. This difference in customs explains the serenity with which our European visitors light their pipes in our first-class coaches, not dreaming of an impropriety; and ignorance of this difference explains the indignation of the brakeman who assaults the foreigner for his breach of the regulations.

In some particulars the European carriage is preferable to the American; the seats are more comfortable; the window-sashes let down so that ventilation can be had (enough to satisfy Mr. Forney) without a draught blowing against the person; and the passenger is comparatively undisturbed by the few persons who enter or leave his compartment during the day; for the brakeman, conductor, newsboy and restless passengers, who open and slam the doors at each end of the coach and rush past the weary victim all day long, in our coaches, cannot disturb him in Europe.

The mode of heating, or rather of not heating the carriages there, with flasks of warm water, is ridiculous; as the passenger cools, so do the flasks, until finally both would freeze together if the weather was cold enough, which it is not. A few carriages are heated with stoves suspended beneath the floors; these were better.

In Switzerland they have contrived a bad compromise between the European and American carriage, combining, in the long car on trucks, the division into compartments of the European carriage with the end doors and centre aisle of the American, which results in the worst railway cars possible, I think. It contributes to the bad reputation of the United States in Europe, that they are called American cars.

Signals and interlocking are very much more employed than with us; the systems differ, and vary with the volume of business upon the railway lines, as might be expected. Our signal companies appear to understand their business as well as it is understood anywhere. The signal posts and telegraph posts, of recent erection, are generally of iron.

Baggage is registered everywhere on the Continent, but not generally in England, although it is there, on some lines; the passenger receives a printed receipt, filled up with the number of parcels and sum of money paid, in writing, and bearing a certain number. Printed labels bearing the same number are pasted on his several packages; he does not need to look after his registered baggage (except at custom houses) any more than he would here.

The weight of luggage carried free varies on the different lines from nothing to about 50 lbs.; the average charge for all carried I found to be about one cent per mile per 100 lbs.

The railway employés are always in uniform, invariably civil, generally attentive, apparently anxious to be of service to the passenger without regard to a tip, which, however, they do not decline. They usually speak some other language besides their own. In Switzerland, which has no language of its own, they speak French, Italian and German, of necessity; many of them speak also English. In Germany, along the lines of travel, English is spoken almost everywhere, although not by all the employés.

The telegraphers in France, Germany and Switzerland will receive messages in English or French.

My observation led to this conclusion: that, although the art of railroading is as well understood in this country as it is in Europe, so far as the building of roads and the running of trains are concerned, yet we do not compare favorably with with the Europeans in important particulars; we do not spend enough in order to secure safety; our employés are not so well disciplined as theirs; our passengers do not receive so much attention and are not so comfortable as they are in Europe.

CHARLES PAINE.

The Cost of a Light Railroad.

ROCK LEDGE HOME, Brevard Co., Fla.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I wish you would kindly publish information as to the best plan of building a tram railroad, giving probable cost, etc. I wish to build a road from Rock Ledge, Indian River, to Lake Poinsett Landing, St. John's River, 4 miles. A trestle, ¾ mile long, over water 3 to 5 ft. deep, will be required. Which of the following plans would be the best?

The cheapest would be a log or pole road laid in the sand, ends spliced together, and wheels with concave rims to run on the logs. Could such a road be used with an engine to advantage over mule power? What would be the cost where logs are convenient?

The second plan would be to lay cross-ties every 3 or 4 feet, and lay 4 in. by 4 in. sawn rails for flanged wheels to run on. I suppose this plan would be four times as expensive as the pole road.

The third plan would be to lay cross-ties every 3 or 4 ft., and lay 28 to 32 lbs. rails on the cross-ties. How would the cost of this plan compare with the others? Would it be necessary to build an expensive road where the income will pay $7,000 annually for only two years, when we expect other roads to supersede it? Possibly this route might continue three, or even four seasons $7,000 a year. Where it will take four mules to do the work on the tram road, would it be better to buy a motor engine for use for only two or three years? Could such an engine be converted to run a circular saw for cutting out orange boxes after the road stops? Would the motor or would the traction engine be the best to buy for running a tram road? What will be the best plan of building trestling, and what will it cost per mile, 6 ft. above ground? These are points presenting themselves to my mind. I am ignorant of the best plans, and am asking for information and advice in the matter.

C. B. MAGRUDER, Rock Ledge, Fla.

[Pole roads have not proved satisfactory, and wooden rails wear out very quickly, especially on curves, and the locomotive requires to be specially constructed to run on wood. Steel rails, 16 lbs. per yard, well spiked and spliced would be far more durable, and could be sold or used again when the road was taken up.

As our correspondent does not give many of the most important factors which determine the cost of any railroad, it is impossible to give even an approximate estimate of cost. If the road is to carry passengers, the cost of even one passenger car would be a considerable item on a road only four miles long. The cost of the rails, locomotive and cars, would depend greatly upon the cost of delivery at the terminus of his proposed railroad. It is equally difficult to estimate the cost of the trestle without knowing the depth to which the piles would require to be driven in the mud. The only general conclusions possible are that the trestle might cost as much as rails, ties, grading and locomotive put together, and that, therefore, it would be hardly worth while to sink money in a trestle which would be abandoned in two years. The rails, locomotive, cars, etc., could, of course, be removed and sold, or used on another line, but the grading and trestle would evidently be so much wasted labor. An estimate for a light logging road 5 miles long, with steel rails 16 lbs. per yard, and one locomotive and twenty logging cars is $22,500 or $4,500 per mile. Still lighter rails can be used, and if only two years' service is required of the engine, a second-hand locomotive would possibly serve the purpose. It is generally found cheaper to use a locomotive than to employ three animals and three drivers, or any equally expensive combination of animals and drivers. A light locomotive costing $1,500 to $1,800 a year will take the place of from 10 to 30 horses or mules.

Our correspondent will find the names of firms manufacturing rails, locomotives, and cars especially adapted to light railroads, in our advertising columns. Some of these firms have had considerable practical experience in equipping cheap roads, and will doubtless be able to give our correspondent some valuable practical advice. We would also advise him to consult a civil engineer on the spot, especially as regards the trestle.—EDITOR RAILROAD GAZETTE.]

The St. John Railroad Bridge.

Work on the railroad bridge at the falls and on the railway is progressing rapidly, and there is now no doubt that trains will be running regularly over the railway and bridge by Jan. 1, 1885. From present appearances the work will be completed by Dec. 1, or perhaps sooner. The heavy cutting at the point where the railway crosses the Straight Shore road has been lowered sufficiently to allow a train to be run over the entire length of the road between the falls and the crossing at Mill street. Two gangs of men are still at work in the cutting, lowering it to the required level and filling in the embankment at Hilyard's mill. When this is done ballasting will be commenced, which will complete the work. Had it not been for an unfortunate accident yesterday, by which a heavy derrick was blown over the bank into the falls, work would now have been commenced on the western shore arm of the bridge proper, the trestle work leading up to the anchorage pier having been completed some time ago. It will take a day or two to replace the derrick, when the work of the western shore arm will be proceeded with.

The *modus operandi* of constructing a cantilever bridge is as interesting as it is peculiar. All manner of wild ideas have been advanced as to how the work would be done by different persons whose experience in bridge building was limited to those body-twisting and spine-dislocating affairs found on country roads. It is quite sufficient to say that none of the ideas projected by this class are as simple as the plan adopted by the engineer in charge and the erecting foreman who will direct the operations of the men building the bridge. Owing to the different circumstances under which a bridge is built, and the fact that no two places over which bridges are thrown are exactly alike, the plan

adopted in building any particular style of bridge is rarely precisely the same so far as the details are concerned, though the principles are often alike. Every visitor to the bridge across the falls will notice that while the pier on the eastern side of the river commences on the rock at low water level, that on the western shore has been perched on the cliff a few feet from its brink, and that it is not more than one-half the height of its companion on the opposite side. There are other important differences between the two shore ends which, although not apparent to the non-professional eye cause the details of erection to be altered. The heaviest work on the St. John bridge is at the western end, where trestle work 395 ft. long had first to be erected before the building of the bridge proper could be begun. Those who watched the progress of the erection of the heavy trestle work across the mill pond can readily form an idea that what appears difficult and heavy work is easily accomplished by men who understand how the work should be done and who have the appliances to do it. With a simple derrick secured on a flat car, the heavy iron girders were lifted up and lowered into position, and when a section was erected the ties were put in and the track laid. The same method of working, adopted while crossing the mill pond, has been pursued in that portion of the work at the falls so far as it has been completed.

But with the commencement of the erection of the bridge proper an entirely different process was begun. The total length of the bridge, between the anchorage piers is 816 ft., the central or river span being 477 ft., the distance between the two main piers. The process of throwing a bridge across such a long span as the latter, without any support, to any but a trained engineer would be an impossibility; but to men who have made a study of the science of mechanics, it resolves itself into an engineering feat within the easy range of possibility.

The shore arm, which on the western side is 190 ft. long, is first constructed. To do this, however, it is necessary to erect heavy staging, or as it is technically termed, false work, to support the immense weight of iron until the whole has been completed. First some 16 stout steel rods are put down through the anchorage piers to the bottom, where they are bent around a heavy steel pin. This forms the support for the inshore end. Section after section of the bridge is then put in place, the iron being lifted by a derrick of great power. The bottom chord is level, but the top chord runs at a considerable angle to the top of the iron columns erected on the main pier, which on that side of the river are 80 ft. high. The principle of supporting, although different, is somewhat the same as that of a suspension bridge; the chord running from the top of the columns to the anchorage pier answering the same purpose as the wire ropes supporting the roadway of a bridge. The iron tower is a most substantial structure, capable of bearing any weight likely to be put upon it. It consists of two great columns of iron, each weighing 28 tons, which are supported by the main pier. They are each built in two sections, the lower one weighing 15 tons and the upper 13 tons. The structure between the two piers consists of eight panels, each 24 feet long, which add to the strength of the roadway. When the inshore section is completed a heavy movable derrick will be run out on timbers supported by the top chord, to the top of the iron columns, and then will be commenced the construction of the river or central span of the bridge. First the lower chord of the first section will be lowered into place and secured. Next the posts will be put in and then the later road which runs diagonally across the section for wind bracing will be placed, and then the floor beam which completes the section ready for the ties, which are next put on and the track laid. Once this work is commenced a panel will be completed every day. The derrick is then run down the chord over the completed panel and work commenced on the second panel, the same routine being pursued in the second instance and so on until a distance equal to the length of the shore arm of the bridge is reached.

Work on the eastern end of the bridge will probably be commenced in a short time. The excavations are now being made for the false work and shore arm, which will be commenced immediately. In a week there will be a decided change in the appearance of things at the falls and along the entire length of the railway. Mr. F. E. Came, the Assistant Engineer in charge, and Mr. H. Hasler, the Erecting Foreman of the bridge, both representatives of the Dominion Bridge Co., are pushing the work vigorously and doing their utmost to forward it. The accident of yesterday, although not serious in any way, will delay the work for a few days, but when the damage has been repaired it will be pushed on more vigorously than ever. Mr. G. Brown, the Engineer in charge of the railway, is also pushing his end along as rapidly as it can be done, with the object of finishing up before the frost stops railroad building for the winter.

The Intercolonial and the New Brunswick railway authorities are pushing to have the railway completed and opened that they may have the advantage of the winter trade in produce carrying, which this year promises to be quite large.—*St. John (N. B.) Telegraph, Oct.* 10.

Consolidation Engine for the Louisville & Nashville Railroad.

The accompanying engravings represent a type of engine lately introduced on the Louisville & Nashville Railroad. Three of these engines, built by the company at its shops at Louisville, are now running on the Henderson Division of the line. The principal peculiarity of the engine is the use of a square-topped fire-box casing, which is named after M. Belpaire, the Chief Engineer of the Belgian State Railroads, where it is very largely used. We believe, however, that the square-topped casing was first used about 1862 on the oldest English railway, the Stockton & Darlington, and that M. Belpaire was the inventor of an improved grate suitable for burning the inferior coal found in Belgium. The grate being used in combination with the square-topped box, M. Belpaire's name was associated with the latter as well as the former.

The square form presents certain obvious advantages, and it is somewhat singular that its use has, with few exceptions been confined to Belgium and North Germany. The plates of the fire-box and casing being parallel to one another, the stays are of equal length and at right angles to the surfaces of the plates, and therefore the stay-holes can be more easily and accurately drilled and tapped than with the ordinary form of casing with direct stays, which must necessarily enter the plates at an angle, which in some cases is so great that no one complete thread is in the plate. A steam-tight job can then only be obtained by very careful riveting, and if nuts are used, much depends upon the accuracy with which the cant washer is fitted against the plate.

The boiler which we illustrate is probably the largest of the kind ever built, and would certainly appear to be the strongest, many special stiffening pieces and braces being used to prevent any possible distortion under the high working pressure, 150 lbs. to the square inch. The use of direct stays, instead of crown bars, saves a great deal of metal, which can be usefully employed in enlarging the boiler and fire-box generally, and it will be seen that this has been done in the engine in question, the barrel being no less than 60 in. diameter, and the fire-box being 9 ft. 9 in. long inside.*

All the longitudinal seams of the boiler have an inside welt put on after the lap joint is riveted up, thus making a very strong joint. The barrel of the boiler near its junction with the fire-box casing is strengthened by various bars and angle irons, which are clearly shown in the accompanying illustration. The boiler is tested to 200 lbs. per square inch with cold water, and the working pressure is 150 lbs. per square inch. The whole of the boiler and fire-box plates are of steel.

The crown and top sheets are parallel and 23 in. apart, and slope backward 1 in. to the foot. The fire-box is 9 ft. long inside. There are 200 tubes 2 in. diameter and 11 ft. 5 in. long. The brick arch is supported on four bent tubes. The water spaces at the bottom on sides and back are 3½ in. in front, 4 in. on sides, 5½ in. above and 3½ in. below and at back end. Stay-bolts are spaced 4½ in. between centres. The crown-bolts are spaced 4½ in. to 5 in. centres, and are 1 in. in diameter and have nuts on the lower end. The back sheet is stayed by four pieces of 3 in. by ⅜ in. angle-iron, and 1⅛ in. round rods, upset at the ends to take 1¼ in. nuts on the outside, and passing forward between vertical and cross rows of bolts to shell of boiler.

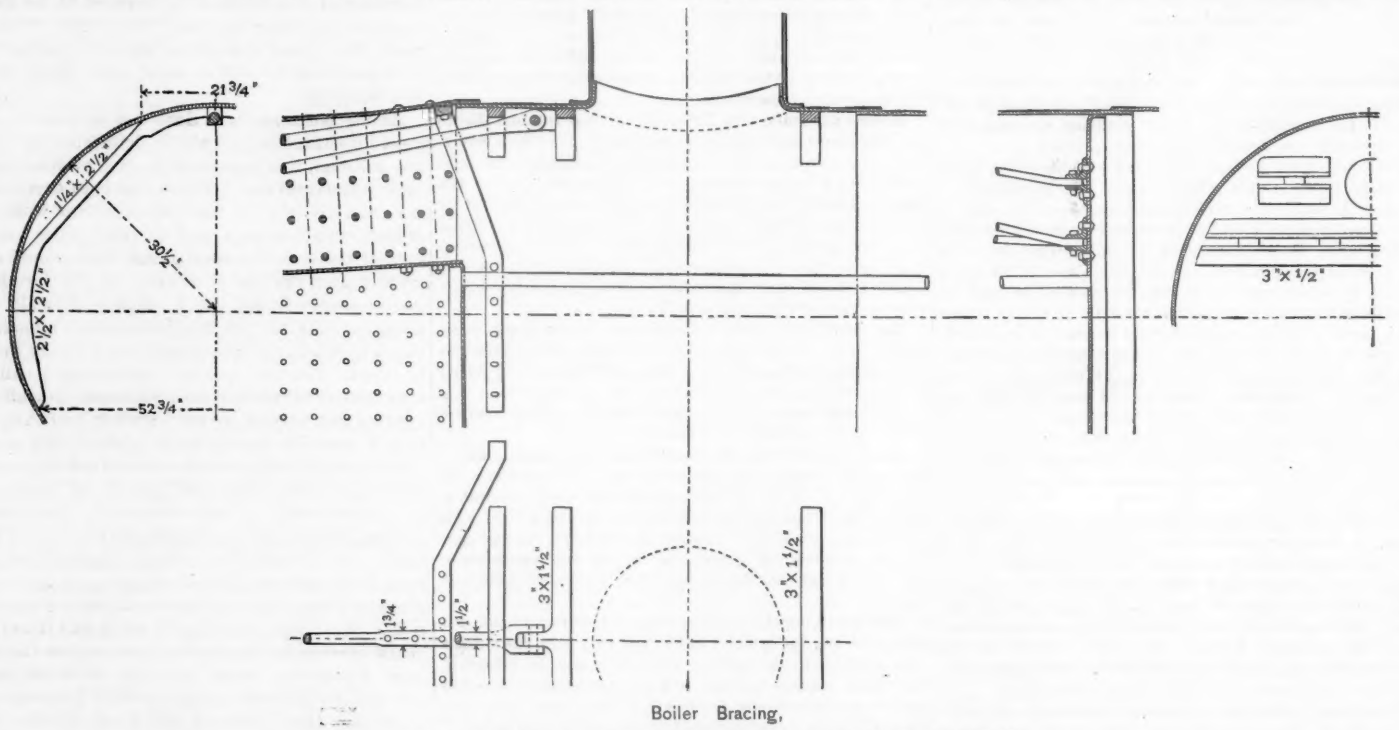
The method by which the junction of the circular shell and the rectangular fire-box casing is braced is clearly shown on the general view of the engine and on the detailed views of the boiler bracing. The same illustration also shows the means taken to stiffen the boiler barrel near the dome opening. These illustrations, taken in conjunction with those that have already appeared in the *Railroad Gazette*, will give a very complete idea of the manner in which this boiler is constructed.

The front wheels have been put well forward, somewhat increasing the length of rigid wheel base, but enabling the link to be worked with straight rods of sufficient length.

The axles, frame, slide-bars, rods, motion, etc., are made from carefully selected scrap iron at the company's shops at Louisville, the slide-bars, motion pins, etc., being case-hardened and all holes in the link motion being bushed with case-hardened thimbles. The tires are of Midvale steel. The cross-heads are of cast steel made by the Chester Steel Casting Co., the gibs being of hard cast-iron with buttons of brass let in on the wearing surfaces.

The slide valves have the Allen passage, and are balanced or, more correctly speaking, relieved of a portion of the pressure upon them by means of a couple of rings at the back of the valve. The use of rings for this purpose is by no means new, and as generally applied, their use has not been always satisfactory on either locomotives or marine engines. While valves of this class have worked well on locomotives as long as steam was on, they have given trouble by cutting when running down a long grade without steam. Any annoyance from this cause is obviated in the valve under notice by allowing the balance-ring to fall $\frac{1}{16}$ in. from the face when steam is shut off. Two small spiral springs (as shown in the drawings of the valve, Fig. 1) take part of the weight of the ring, but are not sufficiently strong to press it against the working face formed on the valve-chest cover. This can only be effected by the pressure of live steam in the steam-chest. The chief peculiarity of the valve lies in the means taken to insure the balance-ring wearing no shoulders on the surface of the cover. The edges of the ring always over-ride the edges of the raised surface on the valve-chest cover, even when the valve (which is shown in plan in fig. 2) has its minimum travel. To effect this the working surface of the balance ring is extended toward its centre, so that during the shortest travel, the point *B* on the ring will always run a little beyond the point *C* on the valve-chest cover, and similarly the point *D* on the ring will always over-ride the point *E* on the cover. Thus no ridge can be formed on the ring or cover. A tight sliding joint is made between the balance ring and the body of the valve by a plain cast-iron packing ring sprung into a groove cut in the valve. Fig. 1 is a longitudinal section of the valve, fig. 2 is a plan of the raised working face on the steam-chest cover, fig. 3 is a half cross section of the valve, and fig. 4 contains two views of the balance ring. If the inner extension of the ring were not perforated as shown the film of steam between the ring and the steam-chest cover would force the ring downward and off its face: the pressure on the upper surface of the ring acting on a larger area than that outside the packing ring exposed to upward pressure. The area of the upper portion is therefore diminished by numerous ⅝ in. holes, so that the ring has no tendency to fall off the face when steam is on.

Much trouble is often experienced in casting the Allen form of valve, as it has been found especially difficult to vent the core forming the main cavity of the valve, gas collecting and forming spongy places at *A*, *A*, fig. 1. This



Boiler Bracing.

CONSOLIDATION ENGINE, LOUISVILLE & NASHVILLE RAILROAD.

* Illustrations of this boiler will be found in the issue of the *Railroad Gazette* for Oct. 26, 1883, pages 702, 704, 705.

trouble has been avoided at Louisville by making this a green sand core, and venting it through a large aperture going completely through the crown of the valve. This is afterwards drilled out, and a piece of brass tube is drifted into the hole and the ends of the tubes riveted over. The internal passage is formed with a dry sand core.

The hopper in the bottom of the smoke-box is fitted with a brass slide valve, which can be moved by a hand wheel and screw. The valve seat is of brass cast with the hopper, which is of cast-iron. It is found that the moisture and sulphur in the ashes corrode a cast-iron valve seat and render it difficult to move the valve. The construction of this hopper and valve is clearly shown in the cross section of the extended smoke-box.

The engines are painted with iron oxide paint of a rich brown color, which looks well. No difficulty is found in getting this paint to a smooth surface, which is a complaint sometimes brought against iron oxide paints. The color, however, has not proved so durable as in paints with a lead basis, though allowing for the difference in first cost, the iron oxide paint appears to be the cheaper.

The principal dimensions of the engine are as follows:

Cylinder	20 in. by 24 in.
Diameter of drivers	51 "
Tractive force per lb. average pressure on pistons.	188.2 lbs.
Weight in working order	111,000 "

Stolen, Short, Over, Unclaimed and Damaged Freight.

[From Marshall M. Kirkman's forthcoming work on "The Theory and Practice of Collecting Railway Revenue without Loss."]

(*Copyright* 1884 *by Marshall M. Kirkman*).

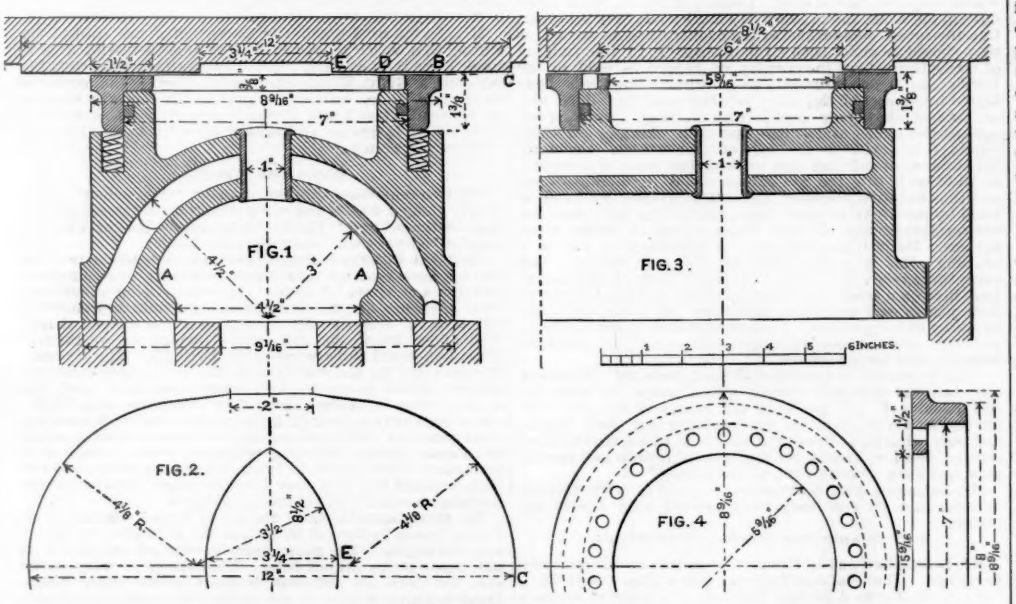
Theory vs. Practice.—The theory and practice of railways are often wide apart. Forms are instituted and arbitrary orders promulgated that do not contemplate evasion or permit of qualification. In actual practice, however, their observance is perhaps the exception and not the rule. The laxity that is permitted in connection with them fosters neglect elsewhere. It is better, therefore, when some principle is not involved, that the exact facts should be duly considered and stated, and the rules and regulations made to harmonize therewith. This will destroy the symmetry or theoretical perfection of many rules and regulations, but the service will be benefited thereby. In the actual operation of railways every department, branch and subdivision of the service will maintain that special latitude must be granted it in order to allow business to be conducted expeditiously and in accordance with the actual necessities of every-day life. This is only partially true. The necessity, or assumed necessity, for the exercise of discretionary power on the part of the operative arises, in many cases, from ignorance as to what is really required by the carrier, or from the disposition innate in man to have his own way. Both of these, in the operations of great corporations, have the effect of positive laws, and must therefore be considered with the same soberness that we view positive laws. It avails nothing to say that men must familiarize themselves with the work required of them, or that they must acquiesce fully and heartily in the methods devised for their government, because they will not do so, although their acquiescence would undoubtedly save them, as well as others, much inconvenience and labor. While therefore we strive to institute perfect methods and ways of doing business, we must remember that the greatest success we are ever likely to achieve will only be approximately good.

The peculiarities of railway service are not less noticeable in the freight department than in the other branches of the business. They are especially noticeable in connection with the operations of freight trains, where, in consequence of the severity of the labor, and the attendant exposure and danger, crews succeed each other in quick succession and sometimes with the regularity of recurring days. In the operations of these trains it is the theory of the service that the men are always alert, that the train is guarded unceasingly day and night, and that when goods are unloaded from the car the articles are compared, item by item, with the way-bill, and in the event any omissions occur careful search is made for the missing property. This is the theory. In practice, however, the train cannot be adequately guarded with the force available, and when it hauls up at a station the brakeman plunges wildly into the car, and without reference to the way-bill or comparison therewith, seizes everything that he can find consigned to the place in question; when satisfied that all the property has been discovered belonging to that particular station, he jumps from the car, the door is closed and fastened, and the signal given to go ahead. Sometimes property is unloaded on the platform, sometimes in the immediate neighborhood of it. Time is often too precious to carefully consider minor details of this kind: a given distance must be traveled within certain hours, and certain meeting and passing points must be reached at specified times; any neglect to do so involves a chain of delays and possible disasters too serious for any trainman to contemplate, except with serious concern. All freight is not thus unloaded by trainmen, but a great deal of it is; enough to require consideration in attempting to form rules and regulations of which this practice forms an integral part. It is of no use to say that the practice is wrong; that is apparent. It is not only wrong, but any trainman who would refuse or neglect to have the articles checked from the car, item by item, as they are unloaded, when he could do so, should be severely censured. Not only is freight unloaded without being compared with the way-bill, but at small stations it is quite likely that the agent will not be present at all when the work is performed, being engaged in selling tickets, or occupied at the switch, or performing some other necessary work that cannot be put off. He thus perhaps does not see the property until the train leaves, when he proceeds to make such examinations and comparisons as he is able. Where packages are compared with the the way-bill as they are unloaded, opportunity is given to investigate anything wrong. In this way it is often easy to discover why freight is damaged that would otherwise remain unknown, and missing freight may often be found, if search is made at the time, in the car hidden away or covered up with packages consigned to points beyond. Freight is frequently lost through being loaded in the wrong car, or being entered on the wrong way-bill, and if the marks of the package are illegible or have been obliterated or torn off, its identity in such cases will very likely never be discovered. If everybody were honest, and the methods of tracing freight were perfect, and the goods were properly marked, lost property would always be found sooner or later and be sent to the proper destination; but these conditions are not always to be expected, and the fact that it is so is one of the reasons for the disappearance of much of the missing property for which carriers are daily called upon to pay.

Stolen Freight.—Much of the property that is missing is stolen outright. In some cases it is delivered to wrong consignees. It is impossible, at best, to afford perfect protection for goods contained in station-houses and cars, and upon the platforms and docks of carriers. Everywhere and at all times plans are being perfected and conspiracies entered into for the purpose of getting possession of property of this kind unlawfully. Many of the men who handle such goods for the carrier are unknown to him; they are hired to-day and discharged to-morrow. The opportunities of such to do wrong are not great in individual cases, perhaps, but in the aggregate they amount to something startling. It is noticed that damages occur most frequently in connection with those articles that appeal strongly to the appetite of man. This is especially so in regard to apples, oranges, candies, cigars, liquors and kindred freight. Sometimes a package is only broken; in many cases, however, it disappears altogether. These losses occur at the warehouse and in the trains. Every effort is and should be directed by the carrier to prevent goods being damaged or stolen while in his possession. This is especially incumbent upon him, not only because it entails great expense and the service is demoralized thereby, but because his patrons are also injured in their business. Consignees do not make reclamation upon the carrier for every loss or even perhaps the majority of the losses they suffer. The amount is often too small when considered by itself, or the bother is too great, or they dislike to appear constantly before the carrier as claimants. Shippers do not, as a rule, like to make reclamation where the amount is trifling, but by the frequent recurrence such losses amount, in the aggregate, to an enormous sum, and engender a feeling of contempt for the methods of the railway that render such practices possible. In this way their friendliness to the carrier is destroyed and they only await opportunity to transfer their business to other lines, or subject him to harassing restrictions. The result is that whether the carrier pays or not he loses, the loss being greater perhaps in the long run when he does not pay than when he does. If nothing were stolen and proper returns were made in each instance, there would be for every statement of missing freight a corresponding return from some other agent of over freight. The innumerable claims for lost freight paid for by carriers evince something more than carelessness in handling goods or dereliction of duty upon the part of agents. It is evident that the goods are stolen, and hence any method adopted to prevent these losses must consider the subject from this point of view. Safeguards must be thrown around the property while being received from the shipper, while remaining in the warehouse, while being loaded into the car, while lying in the car, in the yards, while in the trains, while being unloaded, while stored awaiting delivery, and finally, in the delivery itself. In every situation vigilance must be exercised and adequate safeguards devised to protect it from the depredations of thieves. Neglect at any point or in any particular will be certain to entail loss sooner or later, for the reason that the very act of neglect invites the depredations which it is so desirable to avoid.

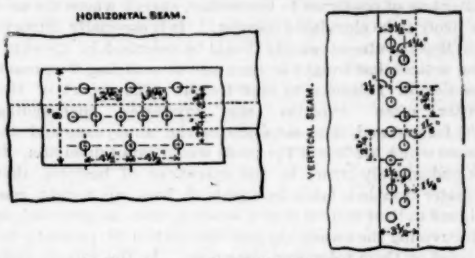
In addition to the losses arising from stolen goods there are the supplemental losses occasioned by the neglect of agents and others to make proper disposition of missent goods, which lie at the stations unnoticed. There is no doubt that much of the freight that is paid for by carriers as lost is still in their possession, hid away perhaps in a neglected corner of some warehouse, or covered up by the debris that accumulates in such places. The periodical examination of freight houses always elicits more or less cases of this kind, which have caused the carrier labor and annoyance, besides the expense involved in settling with the claimant for the missing goods. To remedy these oversights it is necessary that agents should exercise vigilance and that careful and periodical examination of warehouses should be made by those connected with the claim department and others.

Shortages.—Many shortages of weight are only apparent, being occasioned by some error in billing, or in the schedule of property delivered by shipper; where this is the case the weight will be found to correspond with the billing, thus evincing the nature of the error. If it is simply a clerical mistake upon the part of the shipper, and the matter is referred to him without delay, he will quite likely remember the facts, or the nature of the mistake may be determined by reference to his orders and bills of sale; where,

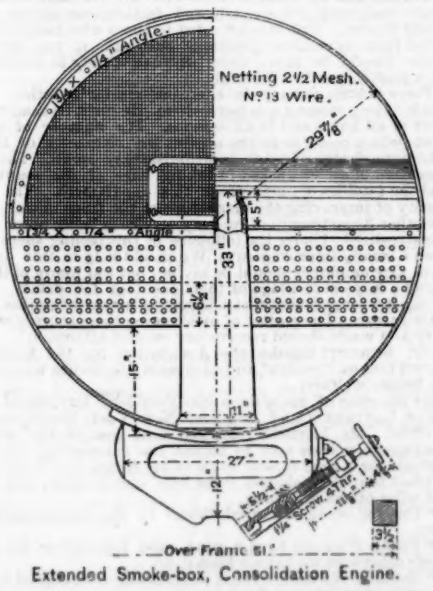


Balanced Slide Valve,

Consolidation Engine Louisville & Nashville Railroad.



Boiler Seams, Consolidation Engine.



Extended Smoke-box, Consolidation Engine.

however, investigations of this kind are delayed, the result is less certain. It is important, therefore, that immediate reference should be made to him, and agents of the company should compare the items entered on the way-bill with his books. It is not desirable in cases of shortages to call the attention of consignee to the matter, except where the case is likely to be elucidated thereby. It is especially important that the utmost celerity should be exercised in forwarding notices that freight is short, and in notifying the proper parties in reference to over freight. The report of the latter often explains the mysteries surrounding the former, and thus saves the carrier annoyance and expense which the loss of the goods would entail upon him. It is undoubtedly true, in the operations of business, that greater trouble is taken by agents to hunt up freight consigned to their station that is missing than is exercised in discovering the ownership and destination of property received by them belonging elsewhere. In the former case, the pressure is immediate and personal; in the latter it is indirect and at best not so urgent. The tendency therefore, is to await results rather than to forestall them. In refer ence to unclaimed property, discretion must be exercised by agents. Freight consigned to parties at or near the station that is assumed will be called for, should not be embraced in the return. The form is intended to cover such freight that there is reason to believe will not be called for, and about the disposition of which the company must, sooner or later, interest itself.

Damaged Freight.—Especial vigilance and promptness must be exercised in connection with all damaged property, or property of a perishable nature; first, in protecting the same so far as possible, from further injury; second, by arranging with the owner in regard to disposition of same, and in the event of damaged freight to take such measures as may be possible to put the same in good order or prevent further loss; third, by notification of the proper officer whenever necessary, and fourth, by such personal action as the rules and regulations require and the law permits. The provisions governing the handling of perishable property, if adhered to, are such as to protect the carrier from loss in any emergency, and it is only by exercising these prerogatives that loss can be prevented. It is therefore hardly necessary to say that these wise and necessary regulations should at all times be properly observed. It is the duty of agents, wherever possible, to discover all particulars attending damaged freight, such as the place where damaged, how damaged, and the occasion thereof. This scrutiny is of the utmost value where business is great, and carelessness in handling property is certain to be engendered by lax enforcement of rules. Each employé through whose hands property passes should feel that neglect to afford it every possible protection is certain to occasion him personal loss. There can be no greater incentive than this, and it will be certain to secure faithful and efficient action upon the part of the multitudinous number of men who are intrusted with the care and handling of the property transported by railway companies, where a less effective penalty would in many cases prove unavailing.

Road-masters' Association of America.

(*Continued from page 747.*)

The President, Mr. BURNETT, then gave a comprehensive address on the prospects and condition of the society. The following is a brief summary of his speech:

The prosperity of the Association is a matter of congratulation. Our managers are pleased to have us come together and our fellow road-masters are becoming more and more interested in the Association. Where life and property are at stake there is no room for experiment. This is the "locomotive age," but we hear too much of railway manipulations and too little of those who care for and run the roads and upon whose skill and faithfulness success and safety depend. Praise is awarded to those who raise themselves from subordinate positions, but equal if not greater praise should be given those who are willing to remain in such positions and be faithful.

There is little romance in the road-master's duties. His work, like a woman's, is never done. He must be ready and alert at all hours and in all seasons. The number of accidents which result from the neglect or incapacity of those who have charge of track is astonishingly small. The co-operation of all was asked in taking care of the manhood and the families of employés in this department. The necessity of improving the moral tone of the force in this and the other departments of railway service is being more and more realized. Under the influence of this feeling there has been a steady improvement. We should help in this direction. Our employés should be saving, but too many of them spend a large percentage of their earnings for drink. The saloon-keeper gets that which is needed for their families and their future. The matter of overcoming these sources of injury and waste should receive our earnest attention.

Mr. BURNETT thanked the Association for the kindness shown him as President and expressed his sincere wishes for its future welfare.

At the close of his address the President introduced Mr. CHAS. LATIMER (Chief Engineer New York, Pennsylvania & Ohio). Mr. LATIMER regretted that none of his twelve road-masters were able to attend the convention. It was difficult for a road-master to leave his duties, but it was important that they should come here once a year, and find out what others are doing.

"The following are vital things in the maintenance of way.

"First: We must have a good solid foundation for our road; otherwise we cannot keep it up.

"Second: We must have it well settled, with a good base, or our ballast will not stay upon it.

"Next, we must have good, strong, well-seasoned oak ties of proper proportion upon which to lay our track.

"Next, we must have a steel rail of proper weight, proportion and quality: a good spike well tested, of proper shape, size, weight and material, and then a joint with which the rail must be fastened.

"Then they must be carefully laid and ballasted. If the road-bed, ballast, ties, rails, spikes and joints are perfect, but the road-bed is poorly ditched, the ties improperly spaced, the spiking badly done, the rails laid without regard to expansion, the gauging erroneously done, and the track not shimmed as the rails are laid; we find that, while partially correct, we have failed in vital things.

"If the frogs and switches are properly selected, but laid with wrong leads and curves, accidents will ensue, and we have again failed in vital things.

"If the rails are too light for the traffic, or of inferior material and quality and improperly drilled, with misfit splices, bolts too short and frogs and switches of wrong size and pattern, another class of vital points have been neglected.

"I know of a road where, on account of an accident at a split switch, the manager decided that every one should be at once removed upon the long line of road and another kind introduced, which was done, but the law of the survival of the fittest came in, and after four years the split switch was restored, at an immense cost of course.

"And again, an accident at a spring frog caused a manager, afraid of his own sole decision and without proper consideration, to abandon all spring frogs and substitute rigid frogs at immense cost.

"This raises two questions: First, What is the best switch? Second, What is the best frog? This depends not only on the best kind or pattern, but on the best construction of that pattern. After the most careful examination and experience of years, I say that a spring-rail frog, *well made*, is safer and four times as economical at the least, as any frog known. I also claim that a split switch, *properly made*, is the cheapest, safest and most durable of all switches. These are vital things involving questions of economy and safety, but they are as yet unsettled in the minds of many.

"Many lives have been lost by switchmen and others getting their feet caught in guard rails, switches, frogs, etc. How shall we prevent this loss of life? Several years ago we tried cinder and wood, and after long thought upon the matter *pro* and *con*, I know nothing better than wood. This question should never be lost sight of until the perfect remedy is found.

"But what are the vital, material things to those things which underlie, and surround, and crown the whole? What can we do without strong muscular arms, good physique, good health, good common sense and heart devoted to the work we have in hand? We all agree in this, and yet to-day the roads are pursuing a course which is dwarfing the race, weakening it body and soul. Outside of any question of religion, that race will be stronger and more intelligent which obeys the law of God. Instead of this we work seven days in the week, and in every day more hours than is proper. Can the future generations of the country be as strong as they should be under such circumstances? In the running of trains throughout the country no regard is paid to the Lord's day upon railroads, and railroad employés have lapsed into a sort of Egyptian bondage and they dare not, or, because they reap profit from it, they cannot, speak against this evil. And so here and there families on these Sundays are without the care of their fathers. Certainly the children of railroad men worked thus must be dwarfed. In addition to this, the law broken leads to intemperance, and thus Sabbath breaking and intemperance go hand in hand by authority to break down everything held dear by our forefathers and all that distinguishes us above other nations. Many of you will wait for a Sunday to put in a crossing; this is entirely unnecessary and wrong. Get everything ready at the point of repair, and at the opportune time on a week day, hurry matters, and the job will be done just as well and better, and there will be no Sabbath breaking to account for. The greatest evils I see to-day on railroads, and the most vital things to correct are Sabbath breaking and intemperance.

"But humanity is a more vital thing than all. What can any railroad company expect which treats its employés like machines? Let me have the hearts of my men with me and let my competitors care nothing for their hearts, and only what their brawny arm can do by an uninterested service, and I will carry the majority of freight and passengers, and have a better road on less money."

Mr. Latimer's able address was listened to with deep attention, and its conclusion was greeted with hearty applause.

FOOT GUARDS FOR FROGS AND SWITCHES.

Mr. DOYLE had put in Hart's foot guards on his road two years ago. The total cost for equipping a frog was $1.75.

Mr. C. E. JONES (Chicago, Burlington & Quincy) makes a guard sawed out of oak planking, and has had no trouble with them. Cost is very small.

Mr. MERRILL fills the frog up with cinders for his foot guards.

Mr. ADAMSON has adopted a guard made out of a plank 2 or 2¼ in. thick. Car shop scraps are very well suited for this purpose, and as they are in great plenty the cost is necessarily light. Fits the scraps to the different angles.

Mr. PRESTON put the Hart guard on his road about three years ago, and has his entire main line equipped with them. Costs about $1.85 for a single switch, that is, one frog and guard rail, including material and labor. For a three-rail switch, three frogs, guard rails, etc., cost about $3. This is the best and cheapest blocking in use. Two-inch pine planking does not make as good a guard as Hart's.

Mr. COLEMAN fitted 3-in. planking to the frogs, guard-rails, etc. Cinders are unsatisfactory. Was in favor of the Hart block.

President BURNETT: The Hart guard is the best thing.

Mr. LATIMER uses cinders and blocks. Had put in a steel spring, an invention of Huntington's, but it was condemned by his road-masters. Castings are too expensive. A cheap wood was what was wanted, as frequent renewals were necessary. There was great danger, he thought, in filling up all the frogs on the line, as derailment was possible when filled up with snow and ice.

Mr. DOYLE: The rail should not be entirely filled. He only did so to the guard rail.

Mr. JONES: We use a considerable quantity of salt on frogs, and have no trouble from snow and ice.

Mr. J. H. MCDONALD (Chicago & Northwestern) has used guards for two years and cannot be suited. He now uses sheet iron made to fit the lower edge of the ball of the rail and then made concave between the rails. This is not solid, but gives way under wheel pressure. Something was needed that could not be destroyed by the section men's picks.

Mr. DOYLE, summing up all the arguments, thought that the Hart guard should receive the indorsemsnt of the Association until something better was found.

Mr. McQuiston, Mr. Galarneau and Mr. Preston were appointed a committee to report on this subject at the next meeting.

The next regular topic of discussion was

THE ELEVATION OF TRACK ON CURVES.

Mr. COLEMAN made his elevation as a rule ⅛ in. to a degree and widens gauge ⅛ in. to every degree. For the first three degrees of curve ⅛ in. easement in gauge is necessary to prevent heavy locomotives from climbing the rails. On 6-degree curves they depress the inner rail 3 in., though the chief engineer is not thoroughly satisfied as to the proper elevation. In yard work, little or no elevation is used. In one case he gave a 23-degree curve the theoretical elevation and the engines ran off—then lowered it to his standard, and there was no trouble. Uses a curve gauge which can be contracted or extended as desired. It is somewhat similar to the Huntington gauge. When through with a curve it is set back to its normal width, namely, 4 ft. 8½ in. Starts elevation at point of curve, gives full elevation and then runs track out 10 ft. to each degree of curvature.

Mr. JOHN SLOAN, whose road has only light curves, gives the same elevation and runs back 50 ft. for each inch of elevation for the first 200 ft.; after that, 30 ft. to the inch.

Mr. JAMES SLOAN prefers ¾ in. to a degree, and runs back not less than 50 ft. to a degree. Thinks 4 or 5 in. elevation enough for the highest curves. Curves are all spiked to their standard gauge, 4 ft. 9 in.

Mr. CALLAHAN thought that all curves should have their elevations begin from point of curve and should start far enough back, say 50 ft., to get the proper curvature. Rail was worn considerably by too much elevation. The elevation should be such as to balance a train on a curve.

Mr. MCDONALD has no definite rule; uses his own judgment. On curves on his main line he is governed by the speed of trains. If 40 miles an hour he elevates a 6-degree curve 3½ in. and for 60 miles 4 in. Begins elevation 170 to 175 ft. from point of curve. At the very highest rate of speed he would not go beyond 4½ in. As a general thing his standard is ¼ to ⅝. A uniform surface is the main thing so that there will be no oscillation.

Mr. CRAIG keeps the gauge at standard and goes back 100 ft. for a 4-degree curve.

Mr. JONES puts up an inch to a degree.

Mr. LOVELL has no fixed rule for his elevations. The subject is left to the superintendents or engineers in charge. Generally elevates ⅝ in. to a degree up to 4 in. and considered 6 in. the highest he would go in any case. Approaches curve at about 50 ft. and spikes curve to gauge; is governed in this, however, mainly by the gauge.

Mr. H. W. REED (Savannah, Florida & Western), advised the adoption of a spiral curve, or at least some other in preference to the circular. Elevating on a level makes the level imperfect. As we cannot begin to elevate where the circular curve begins we should have an easement curve for each end, one in conformity with the elevation, until the circular part of the curve and the full elevation are met at the same time.

Mr. HANOVER regulated his elevation by the speed of the trains. Generally 1 in. to a degree, never less. On 6-degree curves, 6 in. Gets full elevation at point of curve. Defective rolling stock was responsible for oscillation in a greater degree than imperfections in the track.

Mr. ADAMSON: Compound curves are very satisfactory.

Mr. LATIMER finished the discussion of the subject by stating that with a proper curve elevation they were able to haul 1 or 2 more cars. When he was connected with the Atlantic & Great Western he used to elevate ¾ in. on broad gauge and ½ in. on narrow gauge. He has now adopted on his road, New York, Pennsylvania & Ohio, a uniform standard of ½ in. for all kinds of curves and has the most encouraging results.

RAILS AMD WHEELS.

The two remaining subjects, namely, "The effect of unevenly gauged wheels and worn wheels upon the rails, frogs and switches," and "The best form and weight of rails for present rolling stock," were discussed jointly.

President BURNETT thought that improvements in rails had not been kept up with those in weight of locomotives and cars and speed of trains. To one getting down and looking along a line of our common steel rails they show the effects of our heavy traffic like ripples on the water. A half inch added to 4½-in. rail would increase its weight but little, but would add several years to its life. Hardly anything is worse for the road-master than worn wheels. Switch engines should have the best wheels, but they have the worst. One in Joliet broke four frogs in one night. Car wheels vary from 4 ft. 4¼ in. to 4 ft. 5¼ in. Something must give way with such wheels. When the train goes off the blame is laid to the frog, of course, when in fact, it is blameless. There should be 70 lbs. rails everywhere, and the wheels should not vary over ¼ in. in gauge. Line cars make the most trouble in the matter of gauge.

Mr. MCQUISTON favored the 4½ in. Edgar Thompson or Pennsylvania pattern of 67 lbs., as the most economical for a 45-ton engine. The gauge must be widened on curves as the engine frame cannot bend. Uniformity is very desirable, but there are different opinions about many things. These meetings help us to get light and approach uniformity.

Mr. BUHRER had found broken car wheels caused by rails with narrow heads 1½ in. wide.

Mr. CRAIG thought that the increase of play of worn wheels caused more trouble than gauge.

Mr. MCDONALD said that a 70-lb. rail would save at least 10 per cent. in section labor as compared with a 60-lb. On half a mile of that weight he had not found it necessary to spend $25 in four years. Such rails hold up joints without giving. Road-masters are generally too timid about complaining of wheels which injure their tracks, for fear of seeming to interfere with the master mechanic.

Mr. LOVELL had found the web rather too light in their 67-lb. rail. Now use a 69-lb with the added weight in the web. This is satisfactory. His company keeps a perfect record of wheels and allows none in service beyond the term of their life. Then they are broken up and recast. Axles are treated in a corresponding manner.

It was voted that a rail weighing from 65 to 70 lbs. to the yard and 4½ in. high should be considered standard.

Mr. REED: Different roads have different kinds of traffic, ballast, spacing of ties, etc., all of which should be considered.

Mr. CRAIG, after an interesting address on the benefits of the discussions at such meetings and the propriety of recommending standards of ballast, frogs, switches, rails, etc., by the Association, and referring to the weight such action would have with superintendents, moved that a committee of one from each state, if possible, be appointed to report at the next meeting on the subjects and also to take steps to secure a larger attendance. The motion was carried and leave was given to the President to name the committee after adjournment.

Mr. REED advocated a system of apprenticeship for section men, which had worked well on his road for two years. The matter was deferred to the next meeting.

The officers for the ensuing year were then elected as heretofore noted.

The thanks of the Association were tendered to Mr. Chas. Latimer and others. After three ballots Chicago was chosen as the place of the next meeting—its principal competitor being Kansas City.

It was voted to print a verbatim report of the proceedings and give each member two copies, and to assess those who joined in 1883 $1 each.

It was voted that the Executive Committee prepare a certificate of membership which could be used in obtaining transportation to the meetings of the Association.

Adjourned to meet in Chicago on the second Wednesday of October at 10 o'clock a. m.

EXHIBITS.

The following were the principal exhibits of devices made at the convention:

A full-sized rigid frog, by the Ajax Forge Co., of Chicago, Ill.; the Van Dusen Nut Lock, by the Peerless Manufactur-

ing Co., Louisville, Ky.; the Lamberton Wrecking Frog, by Messrs. Sherman & Lamberton; the Iron City Nut Lock, by Mr. Gibson Whaley; Hart's Foot Guard; Gould's Improved Rail Joint, by Mr. W. F. Gould, Des Moines, Ia.; Hydrostatic Car and Track Jacks, by Hogeland & Anderson, Indianapolis, Ind.; the Gale switch; the Fowler spike, by the Fowler Rolling Mill Co., Chicago.

The Forth Bridge.

(*Continued from page* 748.)

Superstructure.—About 42 miles of plates have to be bent for the tubular compression members, and the best method of doing this became a question of great practical importance. Bending cold did not answer, as the true curvatures could not be so attained. Theoretically, a 10,000 ton hydraulic press would be required to bend, truly, our 16 ft. by 1¼ in. thick steel plates, and practically a 2,000 ton press was of no use. Heated in a gas furnace, the plates bent readily, but distorted considerably and irregularly in cooling. Covering with ashes, packing up, and a variety of expedients were tried before the proper method was hit upon, which was to bend the plates hot and to give them a straightening squeeze afterwards when cold. Uniform heating is secured by admitting the gas near the door and midway along the furnace, and an important incidental advantage of the use of tubular compression members thus is that every plate gets relieved from any internal strains which may have been set up by shearing or improper usage at the steel works, which is of the greater moment as steel having the comparatively high tensile strength of 34 to 37 tons per square inch is used for the compression members.

Some 1⅛-in. plates broke like cast iron on being bent cold to a radius of 6 ft., owing to local injury caused by shearing. The damage cannot extend more than $\frac{1}{16}$ in. from the edge, because planing to that extent relieves the plate, and yet it affects the entire width, for the 4 ft. 6 in. plate snapped as readily as the 1 in. wide strip sheared from it. Neither can it arise from "nicking" by bad shearing, because making the plates red-hot cures the evil, though the "nicking," if previously existent, remains as visible as ever. Practically, the important point of interest to bridge-builders is that with planed edges and drilled holes we have had no mysterious fractures, but the Forth Bridge plates have behaved as a material having as the higher limit a tensile strength of 37 tons per square inch and an elongation of 17 per cent. in 8 in. should behave. Our specification for steel in compression is 34 tons to 37 tons with an elongation of 17 per cent., and for steel in tension 30 tons to 33 tons with 20 per cent. elongation. The strength rarely varies as widely as the stated limits, and the elongation averages some 3 per cent. more. One of the plates which fractured from sheared edges when bent cold was tested by me in a variety of ways. A specimen made red-hot and cooled in water at 80 deg. stood 38.3 tons per square inch and elongated 21 per cent. Another specimen made hot and allowed to cool in air stood 36 6 tons and also elongated 21 per cent., whilst one planed from the plate direct without heating failed with 34.3 tons, but extended 25 per cent. For practical purposes, therefore, it mattered little how the plate was treated, provided the effect of the shearing was eliminated by planing or by heating.

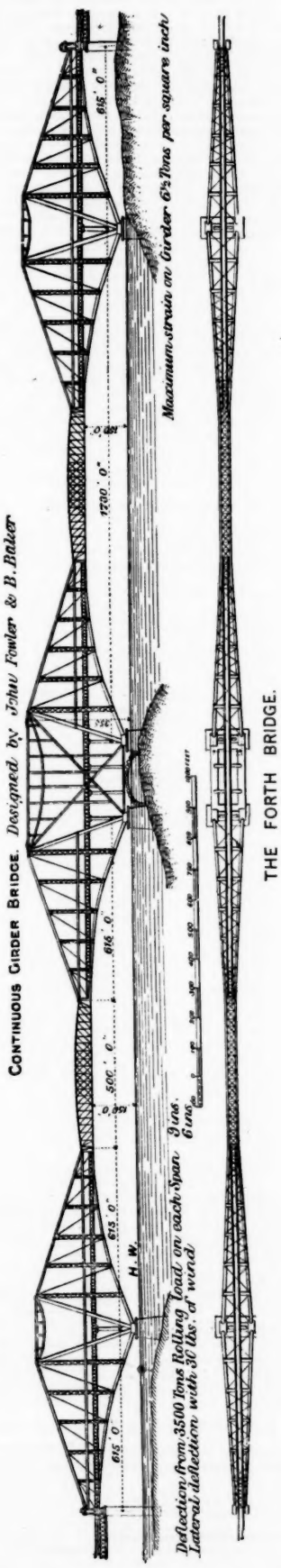
When bent, the plates are planed at the edges in the usual way, and at the curved ends by a specially designed radial machine. They are then, with the internal stiffeners, temporarily built into a tube round a mandrel, and drilled through plates, covers and bars at one operation. Four specially designed annular drill frames, surrounding the tubes, and furnished each with ten traversing drills, capable of attacking every hole, travel along lines of railway in the building yards, so laid out that four lengths of tube, each of about 400 ft., can, if desired, be dealt with at once. In a 16 ft. length of 12 ft. diameter tube there are about 1600 holes to drill through from 2¼ in. to 3¼ in. thickness of steel, which operation takes about 52 hours' working of the drills. Continuous working is, of course, not possible, as the machine has to be advanced every 8 ft., which is the shift of the butts in the plating of the large tubes.

Over the piers the arched tubular lower member forms a connection with the upper bedplates, the vertical and diagonal tubes, and the lateral and vertical cross bracing, so that considerable thought had to be given to the details at this point. A full-sized model was prepared, and different modes of arranging the junctions were set out and modeled. Finally it was decided to gradually change the tubular lower member into a box form with one rounded upper corner, where it meets the skewback or part over the pier, and by internal vertical and horizontal diaphragms, to make the latter a cellular structure of enormous strength and stiffness, offering facilities for attachments in any required direction. Several layers of plates form the bottom of this skewback, and constitute what may be termed the "upper bedplate" of the bridge. The "lower bedplate" consists of similar layers of plates riveted together and bolted to the pier; and the two bedplates are free to slide on each other within certain limits to be referred to more particularly hereafter. The layers of plates run longitudinally and transversely, to meet the different stresses; and, after the edges are planed, the plates are fitted together, clamped between girders, and drilled by special machines through their whole thickness. About 1,000 lineal feet of 1⅛-in. holes have to be drilled in each bedplate, which in practice with the 8-drill machine, takes about 18 days, including stoppages. In the upper bedplates, holes about 11 in. square, with corners rounded to a 3-in. radius, are required, in some instances, to clear the nuts of the holding-down bolts, and these are cut readily by a simple tool devised by Mr. Arrol. In other cases, 12 ft. diameter recesses, 2 in. deep, have to be bored for what may be termed a huge key or dowel, which will connect the upper and lower bedplates, but allow a slight rotation; and this also requires a special tool.

The tension members and cross bracing generally consist of box lattice girders which are drilled by traveling machines of similar type to those already referred to in connection with the tubular members. All of the rivets are of steel, having a tensile strength of about 27 tons, an elongation of about 30 per cent., and a shearing resistance of from 22 tons to 24 tons per square inch. It is hardly necessary to state that hydraulic riveting will be used throughout. The nuts and washers of the holding-down bolts and some other parts are of cast steel, having a tensile strength of 30 tons per square inch, and an elongation of 8 to 10 per cent. The contractors have used steel in preference to iron in some parts of the temporary works, and at their request the 168 ft. span viaduct approach girders were changed from iron to steel with a view to economy.

As originally designed, the cantilevers had a varying batter toward each other from 1 in 7½ at the piers to the vertical at the ends, where they meet the central girder. We have now made the central girders slope inward and maintained the batter of 1 in 7½ throughout, thus getting rid of the previous "winding," which somewhat complicated the details of the cantilever.

We have also modified the attachment of the superstructure to the piers. Formerly the intention was to put an initial stress upon the 12 ft. tubes between the double piers and to bolt the superstructure rigidly to the masonry. Now we secure the superstructure to one only of the four cylindrical piers in each group by the great circular key already referred to, and permit a certain amount of sliding on the others. Owing to the enormous size of the structure elastic deformations which may be neglected in ordinary cases have to be provided for. A very great deal of consideration has been given to this important point, and the calculations have necessarily been complex and tedious, but we think we have now made the best disposition attainable to resist all possible and improbable hurricanes striking



the bridge locally or throughout the whole span, and all variations of temperature likely to be met with at the Forth.

The question of clothing the tubes between the piers with some non-conducting material will be left for future settlement after the movements under changes of temperature have been registered by the tube itself. Fortunately we are not troubled with great variations of temperature and the correspondingly great changes of form in metallic structures. At the new Clyde Viaduct in a length of 376 ft. the observed annual range is 2 in., or a fraction over ½ in. in the 100 ft., and this is an open lattice construction, whilst the Forth Bridge horizontal members between the piers are closed tubes. During the early stages of erection, before much weight comes on the bedplates, the tube will be practically free to expand and contract. Ultimately, when the whole weight of the completed structure rests on the piers, the friction between the two surfaces of the upper and lower bedplates will probably be sufficient to prevent movement except under extremes of temperature and heavy wind pressure of rare occurrence. The attachment of the superstructure to the piers partakes thus of the character of a safety friction clutch. Movement will not occur under ordinary circumstances, and if an excessive shock from some unforeseen cause arise on the superstructure, it can only be transmitted to the masonry of the pier through the sliding surface of the upper and lower bedplates. Provision is made for lubricating the surfaces.

The Effect of Wind.—Calculations have been made of the extent of sliding and of the stresses on the piers under the twisting action of a hurricane blowing on one cantilever, whilst the balancing cantilever is in a dead calm, and various co-efficients of friction have been assumed. During erection sliding can, if desired, be made practically free by carrying one cantilever further out than the balancing one, and so relieving two out of the four bedplates of weight. In the completed bridge the position of the bedplates could be adjusted by temporarily loading the end of a cantilever.

Experiments on friction vary considerably, but when such large surfaces as 2,200 square feet, which is the joint area of the four bedplates of each main pier, are concerned, there would no doubt be an equalizing effect, which would make the proper co-efficient of friction for the bedplates approximate to the mean of the results obtained with a number of experiments on small areas.

Calculations of the stresses on the piers have been made upon the hypothesis that coefficients of 0.10 and 0.25 obtain on different bedplates at the same moment in the manner most unfavorable to the structure. As a final result we are of opinion that the maximum stress on the masonry of the main piers will be something between 9 tons and 12 tons per square foot. So far as compression is concerned, our concrete, which has a crushing resistance of 50 tons per square foot, would thus give a factor of safety of at least four. The solid Arbroath stone piers are, of course, of far greater strength both as regards compression and the shearing and possibly tensile stresses to which the piers may be subject under the extreme hypotheses made as to force and distribution of wind.

Very valuable data as to the ability of a massive rubble pier in cement to resist a heavy lateral force were afforded by the experimental arch of 124 ft. span and 7 ft. rise built in Paris some 15 years ago. The thrust of the arch was about 1,400 tons, and treating the abutment as an elastic solid, the stress upon the masonry would range from 14.7 tons compression to 8.7 tons tension per square foot. To ascertain the ability of cement concrete to resist heavy shearing and tensile forces, I tested a number of concrete beams having different proportions of cement. Such concrete as that used at the Forth developed a tensile strength under transverse stress of about 10 tons to 12 tons per square foot, so that it was from no inherent weakness in the concrete that masonry was substituted for it in the 36 ft. upper length of the main piers. Our reason for its adoption was that we believed by using natural flat-bedded Arbroath stone set in two to one cement mortar, with both horizontal and vertical bond, we made certain of obtaining practically a monolith, while with concrete, however careful the inspection, there might be cleavage planes of perhaps dangerous extent in places. The special stresses on the piers arising from the cantilever system of construction have received our most close consideration, and we doubt not that the desired factor of safety of four will be obtained as regards all shearing, tensile and compressive stresses to which the masonry may be conceived to be liable under any reasonable hypothesis which can be framed.

The piers rest either on rock or on a boulder clay as hard as rock. The heaviest load at the base of any of the 70-ft. diameter caissons, including the tilting action of a 56-lb. per square foot wind, is about 24,000 tons, or at the average rate of a little over 6 tons per square foot, deducting nothing for the water displaced by the pier.

*Leading Features.**—The principal qualities, dimensions, etc., are:

	Tons.
Steel in main cantilevers	40,000
" centre girders	1,600
" viaduct approach	2,800

Cantilevers, 680 ft. projection; 343 ft. and 40 ft. deep.

Bottom member of cantilever, a pair of tapering tubes:

Distance apart centres at piers			120 ft.
" " " ends			31.5 "
Tube at piers, 12 ft. in diameter,	1¼ in. thick,	836 sq. in.	area.
" ends, 5 ft. "	⅝ "	120 "	"

Top member of cantilever, a pair of tapering box lattice girders:

Distance apart centres at piers	33	ft.
" " ends	22.25	"
Girder at piers, 12 ft. by 10 ft	,506 sq. in.	net area
" end, 5 ft. by 3 ft	60	" "

Columns over piers, 12 ft. diameter, 368 to 468 sq. in. area.

Diagonal struts (tubes), 8 ft. to 3 ft. diameter, 198 to 73 sq. in. area, and 337 ft. to 74 ft. long.

Diagonal ties (box lattice), 8 ft. to 3 ft. deep, 163 to 67 sq. in. net area, and 327 ft. to 82 ft. long.

Horizontal wind bracing (box lattice), 11 ft. to 3.5 ft. deep, 88 to 20 sq. in. area, 142 ft. to 40 ft. long.

Vertical wind bracing (box lattice), 4.75 ft. to 2.5 ft. deep, 84 to 28 sq. in. area, 160 ft. to 60 ft. long.

Central girder, 350 ft. span, 51 ft. and 41 ft. deep; bottom members, 32 ft. apart centres, 142 sq. in. net area; top members, 22.25 ft. and 19 ft. centres, 139 sq. in. gross area.

Internal viaduct, lattice girders with spans of 39 ft. to 145 ft.

Floor, buckle plates and trough girders.

Wind fence, close lattice work, 4 ft. 6 in. high.

Viaduct approach, lattice girders, under rails continuous over two 168 ft. openings, 22.5 ft. deep, 16 ft. apart. Floor and wind screen as for internal viaduct. Masonry piers 25 ft. by 8 ft. at top and 50 ft. by 20 ft. at base.

Rolling load: (1) trains of unlimited length on each line of rails, weighing one ton per foot run; (2) trains on each line made up of two engines and tenders, weighing in all 318,080 lbs., at the head of a train of 60 short coal trucks of 33,600 lbs. each.†

Wind: A pressure of 56 lbs. per square foot striking the whole or any part of the bridge at any angle with the horizon and acting square or obliquely upon an area equivalent to twice the plane surface of the front girders, with a deduction of 50 per cent. in the case of tubes. The total wind pressure so derived amounts to 4,500,000 lbs. on the 1,700 ft. span and 17,700,000 lbs. on the whole superstructure included between the two cantilever end piers.

Stresses.—The following table shows the magnitude and intensity of the heaviest resultant stresses in tons of 2,240 lbs.

* The accompanying illustration represents the structure as originally designed.

† Each train would be about 1,070 ft. long and weigh in all ,334,080 lbs., or 2,181 lbs. per foot forward.

on some of the principal members from dead load, live load and wind, distributed as above described:

	Dead.		Live.		Wind.		Total.	
	Gross stress.	Stress per sq. in.	Gross stress.	Stress per sq. in.	Gross stress.	Stress per sq. in.	Gross stress.	Stress per sq. in.
Bottom member	2,282	2.8	1,022	1.2	2,920	3.5	6,224	7.5
Top "	2,253	4.4	997	2.0	544	1.1	3,794	7.5
Vertical "	1,550	3.3	705	1.5	1,024	2.2	3,279	7.0
Diagonal struts	802	4.1	167	0.8	414	2.1	1,383	7.0
" ties	754	4.6	186	1.2	194	1.2	1,134	7.0
Hor. wind bracing	80	0.9	5	.1	265	3.0	350	4.0
Ver. " "	42	0.5	169	2.0	108	1.3	319	3.8
Central girder top	337	2.4	303	2.2	182	1.4	822	6.0
" " bottom	330	2.3	301	2.1	247	1.8	878	6.2

Owing to the batter of 1 in 7½ of the main girders and the adoption of double piers, not merely at Inch Garvie, but for the main piers on either side of it, the calculation of stresses involves some interesting and complicated problems. It is fortunate that from the nature of the grounds no unequal settlement can occur in the foundations, or some of the stresses would be indeterminate by reason of the double piers, which were not a feature of the original design.

At the centre cantilevers any unequal loading is supported by the double bracing between the piers at Inch Garvie, but at the north and south cantilevers the support is twofold—namely, the resistance of the bracing, and the pull on the holding-down bolts at the cantilever end pier. The first problem that arose, therefore, was to ascertain how much of the load would be supported by each of these reactions.

But the weight of each part was not known, and in a structure of this magnitude it required to be ascertained with accuracy. This could only be done by the method of trial and error, and as the stresses produced by the weight of the structure itself are very considerable, and as the secondary bracing is an important item, detailed drawings had to be made and carefully measured several times before the stresses could be determined. The inward slope of the cantilever gave rise to forces of sensible amount from the component of the vertical forces square to the plane of the cantilevers. A much more difficult problem, however, was presented by the stresses produced by wind. Thus, for example, a force acting horizontally on the cantilever near the 350 ft. girder, and at right angles to it, produces at the main pier a downward pressure on the leeward side, and an upward action on the windward side, together with a twisting action, and vertical and lateral pressures on the cantilever end pier. All these forces had to be traced through the different members and bracings, and the same had to be done for a wind force acting as a moving load at every point of the cantilever. It was also essential to consider the wind as blowing not only at right angles to the line of the bridge, but also at such other angle as would impose on each member the greatest amount of stress. It will be readily seen that the stresses produced by wind are very severe, and, therefore, exactness was required in order that no part might be unnecessarily heavy, nor on the other hand be strained beyond the allowed amount. After all the stresses as a framework structure arising from the dead load, a traveling train, and from wind, has been ascertained, a new set of problems arose, chiefly from the magnitude of the work, and the weight of the different members themselves, which cause local stresses of considerable importance in some instances.

An all-important point was, of course, the stress per square inch admissible upon the several tension and compression members. The only limit practically imposed upon us by the Board of Trade was that the stress should not exceed one-fourth of the ultimate strength of the steel without reference to the question of the relative proportions of live and dead load, or the character of the stress. In settling the sectional areas we did not bind ourselves to any formula derived from Wöhler's or other experiments on the fatigue of metals, but considered each member separately and had reference to the whole of the circumstances, including the character of the riveting and other details of construction. As many competent engineers are of opinion that the rational way of proportioning structures is to assume varying ultimate resistances of the metal for the different proportions of dead and live load, and adopt a uniform factor of safety of 3, we tested the actual areas of the Forth Bridge members by the following rules, and found in all cases an excess on the requirements:

a. For a constant load assume the ultimate tensile strength to be 30 tons per square inch.

b. For a load varying from *nil* to a maximum assume the strength to be 20 tons per inch if the alternation of stress is frequent, and 22.5 tons if it is seldom, as in the case of a hurricane.

c. For alternate tension and compression assume the ultimate strength to be 10 tons if frequent and 15 tons if seldom.

The above apply to tension members, and are to be divided by 3 for the working stress. For struts the working stress equivalent to the above, from the results of my own experiments and from other considerations, I take to be 40 per cent. of the stress causing first flexure, as given by the following empirical formulæ:

$$f=(0.44-0.002\ r)\ (t+18) \text{ for tubes}$$
$$f=(0.40-0.004\ r)\ (t+18) \text{ for lattice}$$

where r=ratio of length to diameter and t=tons per square inch, as set forth in paragraphs *a*, *b* and *c*, but increased in all cases in the ratio of 34 to 30, which are the specified minimum strengths of the steel used for compression and tension members respectively.

Any structure proportioned by the above rules would have an ample margin for safety, but as already stated the stresses in the case of the Forth Bridge are lower than indicated. The diagram of stresses shows that the lower tubular member is the most affected by wind, and, in fact, under the conditions assumed the leeward tube does the work and the windward is almost relieved of stress. Looking at the huge 12 ft. tubes as they now lie at the Forth Bridge works, with their ten longitudinal T bars 12 in. by 7 in. by ⅜ in., having double angles riveted to the web of the T, and with annular stiffeners every 8 ft., certainly nothing could appear better adapted to resist stress and fatigue, and I should not feel the least anxiety if they were subject to double the stress which will ever be imposed upon them. I may add that the preceding formula for struts is based upon my experiments with steel ranging from 36 to 56 tons in tensile strength, and fairly represents the average results, though in this instance, as in all others where columns are concerned, individual experiments differ rather widely, owing to initial stress, unequal bearing, or other cause. In proportioning the riveted joints of the tubes and other members, the shearing area is generally made one and a half times the net sectional area of the plates connected if in tension, and half that for planed and butted joints in compression only.

(TO BE CONTINUED.)

A Handsome Pay Car.

Paymaster Johnson, of the Fitchburg Railroad Co., with his two assistants, started this morning on the regular monthly trip over the road, using for the purpose the new pay car which was turned out of the company's shops last week. This car, which is a model of its kind, is elegantly and conveniently fitted up, and is so arranged that it can be used—and it is so intended—for a directors' car. The car is of the usual length and has Allen's standard paper wheels, with Marden's patent malleable iron brake-beam. One end or nearly one-half of the car, is devoted to the paymaster's office, a wide black-walnut counter running nearly across the car, underneath which is the safe, and in front and behind which also suitable closets for books, papers, etc., are provided. An apartment in the centre of the car contains the Baker heater, lavatory and toilet, all so placed as to be convenient, and yet utilizing every foot of room.

In the rear of this apartment and in the other half of the car is a folding bed and elegantly upholstered easy chairs provided for the directors. In a locker beneath the car are carried two cot beds, which can be used when needed in the directors' apartment, either by the officials or—when as now, the car is used by the Paymaster—by the Paymaster's assistants. An oil stove with all its furnishings is also a part of the equipment of the car, and this, with such provisions as may be required, finds a place in a large closet in the directors' room. Three tables that can be lowered or raised at will, are hinged on either side the car behind the large chairs. The whole interior is furnished in solid mahogany and the panels of birdseye maple. Large observation windows are provided at both ends, and these, as well as all the other windows, are handsomely and elegantly curtained. The floors are highly polished and covered with rugs, and the furnishings throughout are well in keeping with the rich and substantial finish. The directors and other officials will at an early date go over the road in the car on their annual tour of inspection.—*Boston Traveller, Oct.* 13.

ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette:*

Oregon Railway & Navigation Co.

At the close of the last fiscal year, June 30, 1884, this company worked the following transportation lines by rail and water:

	Miles.
Ocean Division steamer line, Portland, Or., to San Francisco	670.0
Puget Sound steamboat lines, about	238.0
River Division, steamboat lines on Columbia River and tributaries, about	667.0
Total water lines	1,575.0
Railroad lines:	
Portland, Or., to Riparia	301.0
Bolles Junction to Dayton	13.0
Walla Walla to Blue Mountain	19.9
Umatilla to Meacham	93.4
	427.3
Total transportation lines	2,002.3

The railroad mileage does not include lines under construction. Additions to this mileage are noted elsewhere.

The Oregonian Railway, 150 miles, was operated under lease at the beginning of the year, but the lease was subsequently surrendered, this company claiming that it is not legal. This road is not included in the mileage above.

The equipment of the Railroad Division consists of 74 locomotives; 30 passenger, 8 baggage and 2 mail and express cars; 803 box, 27 stock, 491 flat and coal and 18 caboose cars; 5 official cars, 1 pile-driver, 1 wrecking and 2 boarding cars. There are also 2 locomotives; 2 passenger cars; 29 box, 33 flat and 2 caboose cars of 3 ft. gauge.

On the Ocean Division there are 6 steamships and 1 coal barge; on the River Division 23 steamboats, 1 steam launch, 10 barges and 9 wharf-boats; on the Puget Sound Division 8 steamboats and 1 barge.

The general balance sheet, condensed, is as follows:

Liabilities:	
Stock	$24,000,000
Funded debt	11,919,000
Interest, sinking fund, and dividends, accrued and declared	675,158
Bills payable	454,127
Accounts, vouchers, etc.	678,006
Book and suspended accounts, balance	358,960
Canceled sinking fund bonds	301,650
Profit and loss, balance	1,460,292
Total liabilities	$39,847,193
Assets:	
Construction, equipment and real estate	$31,721,750
Columbia & Palouse R.R.	2,559,952
Willamette Transportation & Locks Co.	414,360
Walla Walla & Columbia River R.R.	631,350
Cascades R.R.	233,293
Washington & Dalles R.R.	1,997
Total permanent property accounts	$35,562,702
Construction material	1,397,356
Operating supplies	433,553
Bills and and accounts receivable	1,116,575
Cash accounts	1,337,007
Total assets	$39,847,193

The funded debt consists of $5,719,000 first-mortgage 6 per cent. bonds, due 1909; $1,200,000 scrip (8 per cent.), one half due Nov. 1, 1885 and one-half Nov. 1, 1886; and $5,000,000 debenture bonds, 7 per cent., due in 1887. The debenture bonds were issued during the past year.

RAILROAD LINES.

The traffic of the company's railroad lines, an average of 420 miles last year, and of 351 miles the preceding year, was as follows:

	1883-84.	1882-83.	Inc. or Dec.	P. c.
Passengers carried	166,389	128,684	I. 37,705	29.2
Passenger-miles	19,489,276	13,027,107	I. 6,462,169	49.6
Tons freight carried	427,216	300,818	I. 126,398	42.0
Ton-miles	74,581,876	44,179,483	I. 30,402,393	68.8
Average rate:				
Per passenger-mile	3.99 cts.	4.11 cts.	D. 0.12 cts.	2.9
Per ton-mile	3.45 "	4.77 "	D. 1.32 "	27.7

The decrease in rates is partly due to the carrying of through traffic to and from the Northern Pacific road, and partly to a general reduction in local rates.

The earnings of these lines were as follows:

	1883-84.	1882-83.	Inc. or Dec.	P c.
Earnings	$3,535,015	$2,810,402	I. $724,613	25.8
Expenses	1,503,164	969,984	I. 533,180	55.0
Net earnings	$2,031,851	$1,840,418	I. $191,433	10.4
Gross earn. p. m.	8,417	8,007	I. 410	5.1
Net " "	4,838	5,243	D. 405	7.7
Per cent. of exps.	42.50	34.51	I. 7.99	....

The increase in earnings was relatively much less than that in traffic, owing to the lower rates as noted above. On traffic to points in Washington Territory for most of the year this company received only its proportion of the through rate; it now receives full local rates.

GENERAL STATEMENT.

The earnings of all the lines for the year were as follows:

	Earnings.	Expenses.	Net earnings.	P. c. of exps.
Ocean Division	$784,329	$496,033	$288,295	63 3
River Division	697,315	587,643	109,672	84.3
Puget Sound Div.	319,028	248,640	70,384	77.9
Railroad Division	3,535,015	1,503,164	2,031,851	42.5
Narrow-gauge Div.	29,220	46,848	*17,628	160.3
Total	$5,364,907	$2,882,332	$2,482,575	53.7
Total, 1882-83	5,100,513	2,624,171	2,476,342	51.4
Increase	$264,394	$258,161	$6,233	2.3
Per cent	5.2	9.8	0.3	...

* Deficit.

The earnings of the Narrow-guage Division are not given separately in the report and can only be obtained by comparison of other statements. This division was worked only part of the year, as noted elsewhere.

The income and profit and loss accounts may be stated as follows:

Net earnings, as above		$2,482,575
Balance of general interest account		170,887
Dividends, etc., received		130,557
Total net income		$2,784,019
Taxes	$89,124	
Interest	440,160	
Sinking fund	75,840	
Rentals	354,180	
Stock transfer expenses	4,015	
Dividends, 7½ per cent.	1,800,000	
Depreciation of steamers	91,000	
		2,854,319
Deficit for the year		$70,300
Dividend, Aug. 1, 1883, charged to previous year		450,000
Sinking fund to June 30, 1883		224,479
Betterments and adjustment, Oregonian Co.		17,881
Reduction in price of rails in stock		40,904
Total charges to profit and loss		$803,564
Credit balance, July 1, 1883		2,263,856
Profit and loss, credit balance, June 30, 1884		$1,460,292

Four quarterly dividends were paid during the year, one of 2½ per cent., one of 2 per cent. and two of 1¼ per cent. each, making 7½ per cent. in all.

Expenditures for additions to property during the year were as follows:

New lines and improvements, Railroad Division	$3,977,030
New docks, improvements, etc., Ocean and River divisions	203,044
New equipment, Railroad Division	886,601
New steamboats, etc., River and Ocean divisions	502,615
Total new construction and equipment	$5,569,290

This was provided for chiefly by the issue of new bonds, as noted elsewhere.

The Ocean and River divisions show decreases in earnings, partly due to the opening of the Northern Pacific and partly to the transfer of business to the railroad. The Puget Sound Division shows a slow but steady increase.

GENERAL REMARKS.

The only increase in the railroad mileage opened for business and operated during the year was the extension of the Baker City Branch to Meacham, 27.9 miles beyond last year's terminus. The average mileage of road operated was 420 miles. The general condition of the track, buildings and bridges is excellent, except that on a part of the main line originally purchased from the old Oregon Navigation Co. the track and bridges require renewal. About 2,000 tons of steel rails are on hand for this purpose. During the

year about 110 miles of track from Wallula to a point near Celilo were relaid with steel.

The only new work done on the main line during the year was for the protection of the track and bridges from freshets, with some work in reducing grades. On the Walla Walla Division track has been laid from Pendleton to Centreville, 16.8 miles. The grading between Centreville and Blue Mountain was nearly completed when work on it was suspended, and has not since been resumed. On the Baker City Division work was resumed in April, and has been pushed vigorously ever since. At the close of the fiscal year track had been laid to a point 177 miles east of Umatilla, although only 65 miles are in regular operation. The grading is so far completed that tracklaying will not be delayed, and it is expected that the connection with the Oregon Short Line at Huntington will be completed by November.

In April last the company became the owner of the Columbia & Palouse road by the purchase of all the outstanding bonds and stock. The amount of bonds so purchased was $2,829,000 and the price paid, which included the stock, was $2,489,520. As a condition of the purchase the Oregon & Transcontinental Co. paid in advance the interest on the bonds for two years at 6 per cent. This line runs from Palouse Junction, on the Northern Pacific Railroad, to a point three miles east of Colfax, Wash. Ter., a distance of 92 miles, and the grading is completed to Moscow, Idaho, 25.5 miles further east. The road was turned over to this company June 5, but was not in condition to operate on account of extensive washouts. It was opened to Colfax for business Aug. 1, after the close of the year. The completion of this road to Moscow is recommended, as the grading is done and nearly all the material on hand.

When the construction now under way is completed the mileage of the railroad division will be as follows: Portland to Riparia, 301; Walla Walla to Blue Mountain, 20; Pendleton to Centreville, 17; Palouse Junction to Colfax, 89; Umatilla to Huntington, 217; total, 657 miles.

In settlement of a claim against the Oregon Improvement Co. this company has accepted the conveyance of 129,056 acres of land and surrendered the steamer "Santa Rosa."

The question of the validity of the lease of the Oregonian Railway is now before the courts, this company's counsel assuring it that the lease will finally be declared void. (The United States Circuit Court has lately decided, since the date of the report, that the lease is valid, but it is probable that an appeal will be taken.)

To provide for the payment of the scrip certificates and for the company's other requirements, and also to provide for the first-mortgage bonds at maturity, an issue of $14,000,000 of consolidated 5 per cent. bonds was proposed in January last, and their sale negotiated under favorable terms. The plan having been found impracticable, owing to the Oregon law in regard to mortgages, it was then abandoned. The company then issued $6,000,000 in debenture bonds bearing 7 per cent. interest, and having three years to run from April 1, 1884. Of these bonds $5,000,000 have been sold and the proceeds applied to the payment of the floating debt, the purchase of the Columbia & Palouse road, and the construction of the Baker City Branch. The remainder will be sold as required for construction.

This company has a claim against H. Villard of about $420,000, to secure which it holds a lien on his property on Madison avenue in New York, which, it is expected, will bring enough to pay the claim.

During the year two new steamers were added to the Puget Sound fleet at a cost of about $700,000. To the railroad equipment there were added 23 locomotives, 10 passenger, 3 baggage, 363 box and 2 officers' cars; and there are 300 freight cars in process of construction. No further additions will be needed during the current year.

In relation to the proposed lease of the company's property the report says: "Negotiations are in progress for a contract with the Northern Pacific Railroad Co. for the operation of this company's lines under a guarantee of earnings. The matter has not, however, at this date made such advance as to justify any opinion as to the result of the negotiations."

Pullman's Palace Car Co.

This company operates in all 1,148 sleeping and parlor cars, of which it owns 669 directly and 479 through controlled companies or in partnership with railroad companies. In addition to these cars it owns extensive shops where it builds and repairs its own cars, and also builds many cars, both passenger and freight, for other parties. Its report is for the year ending July 31 last.

The general account at the close of the year was as follows:

Liabilities.

Stock (including $400 fractional scrip)	$15,924,800.00
Funded debt	2,269,500.00
Amount received from sale of old cars leased from Central Transportation Co	441,370.49
Surplus	7,533,711.92
Total	$26,169,382.41

Assets.

Cars (669) and equipments, including franchises, cost	$11,326,337.76
Amount invested in other car associations, controlled and operated by this company, cost	3,339,089.34
Stock in Union Foundry and Pullman Car Wheel Works	250,000.00
Other stocks and bonds	285,986.50
Real estate and plant, Detroit shops	381,385.17
Real estate and plant, 508 acres of land, Chicago Car Works, homes for workmen and other improvements at Pullman, Ill	6,434,828.95
Real estate and plant, St. Louis shops	115,007.28
Plant, Mantua shops	15,973.13
Real estate and new Pullman building, Chicago	649,252.44
Real estate, Cook county	22,320.19
Lumber	702,294.75
Other construction material and operating supplies, including cars in process of construction	1,527,756.91
Patents, United States and foreign	184,633.43
Furniture and fixtures in the several offices of the company, cost	71,679.97
Balance of accounts receivable and payable	592,676.18
Cash	270,160.41
Total	$26,169,382.41

Stock was increased $2,655,300 during the year. The funded debt was not changed; it consists of $445,000 currency 8 per cent. debentures due 1887, and $820,000 due 1892; $955,000 currency 7 per cent. debentures, and $49,500 sterling 7 per cent. debentures.

The surplus account for the year was as follows:

Surplus for the year, as shown below		$1,192,694.40
Loss on old cars sold or destroyed	$62,579.47	
Balance of account, rebuilding old cars	15,666.94	
Depreciation of cars out of regular service	100,000.00	
Doubtful accounts written off	307,214.60	
		485,461.01
Balance		$707,233.39
Surplus, Aug. 1, 1883		6,826,478.53
Surplus, July 31, 1884		$7,533,711.92

Of this surplus the sum of $1,100,000 is represented in the depreciation account, and the balance of $6,433,711.92 in the income account, and invested in assets of the company.

The income account is as follows:

Earning (leased lines included)		$3,424,279.58
Proportion of earnings of controlled companies		488,231.01
Patent royalties		27,709.00
Manufacturing profits, rentals, etc		516,237.84
Total		$4,456,457.43
Expenses, taxes and insurance	$1,119,032.10	
Maintenance of upholstery and bedding	205,455.04	
Proportion of controlled line expenses	136,556.00	
Profit and loss	35,732.50	
Rental of leased lines	264,000.00	
Interest on bonds	171,466.39	
Dividends, 9½ per cent	1,339,621.00	
		3,263,763.03
Balance, surplus for the year		$1,192,694.40

Expenses and maintenances include the leased lines. Profit and loss includes the balance of discount, exchange, current interest, etc.:

A comparison with the previous year is as follows:

	1883-84.	1882-83.	Increase.	P.c.
Gross receipts	$4,456,457	$4,093,245	$363,212	8.9
Expenses	1,488,675	1,369,716	118,959	8.7
Net earnings	$2,967,782	$2,723,529	$244,235	9.0
Interest and rentals	435,467	435,074	393	0.1
Surplus	$2,532,315	$2,288,455	$243,860	10.6
Dividends	1,339,621	1,235,142	104,479	8.5
Balance	$1,192,694	$1,053,313	$139,381	13.2

Expenses here include the working expenses and the maintenance of upholstery and bedding, including controlled lines' proportion.

At the annual meeting President Pullman made the following statement: "During the fiscal year ending July 31, 1884, new contracts for the usual term of 15 years have been made with eight prominent railway companies, including the Illinois Central, the Delaware, Lackawanna & Western, and the Mexican Central. Renewals of contracts have been made with the Union Pacific and the Intercolonial railways, covering altogether a mileage of 10,849 miles.

"At the beginning of the year the number of contracts and the mileage of railways whereon the sleeping and parlor cars of this company were operated were as follows: July 31, 1883: Total number of contracts, 64; mileage covered, 62,270; average life, 8 years, 345 days. July 31, 1884: Total contracts, 72; mileage covered, 69,144; average life, 9 years, 27 days. Increase: Number of contracts, 8; mileage, 6,874; life, 147 days.

"The total number of cars operated at present date is 1,148.

"It will, perhaps, prove interesting in this connection, in the way of illustrating the growth of the company, to state that at the date of its organization, Aug. 1, 1867, it had contracts with six railway companies, with an average life of eight years and eight months, and covering a mileage of railways of about 5,000 miles. Its gross earnings for the fiscal year ending July 31, 1868, were $258,000.

"The results of the manufacturing department of the company are reasonably satisfactory. The total out-put of cars manufactured and repaired during the fiscal year is $6,537,726, of which $3,393,481 is for sleeping and parlor cars built and repaired for account of this company, leaving $3,144,245 as outside business.

"The total profit from the car-shops is $303,132. The net income from the town of Pullman, exclusive of its car-shops, is $207,025.71.

"The growth and general condition as well as the financial results of the town of Pullman are quite satisfactory. The number of inhabitants has increased during the year from 6,685 on July 31, 1883, to 8,329 on July 31, 1884.

"The Pullman Building in Chicago was commenced April 1, 1883, and will probably be completed in February, 1885. The estimated cost of the building when finished is $650,000. All the completed portions of the building are occupied by nine tenants, including the United States Military Headquarters, the general offices of the telephone companies, and the general offices of this company. The present rent-roll is about $51,000 per annum. The estimated rental of the entire building, when completed, is $101,400. It is expected that the net rental will yield about 9 per cent. on the investment, or about 7 per cent. exclusive of the rental of this company's offices.

"Since the last annual meeting the number of stockholders has increased from 1,767 to 2,531."

Ohio & Mississippi.

At the recent annual meeting in Cincinnati the President presented a report which, after reciting the resolutions, giving the plan of re-organization, continues as follows:

"Acting under this resolution, this board took such other steps as were necessary to relieve the property from the custody of the Court, and on April 1, by the order of the Court, the Receiver was discharged, and the board of directors on that day assumed the control and management of the property.

"As provided in the plan, the proceeds of the bonds sold have been applied to the payment of arrearages of interest on the existing mortgage debts, the unsecured debts and the mortgage indebtedness already matured, and also to the purchase of additional rolling stock.

"The present financial status of the company is as follows:

Liabilities.

First mortgage, 7 per cent	$6,502,000
First mortgage, sterling, 6 per cent	112,000
Second mortgage, 7 per cent	3,829,000
Springfields, 7 per cent	2,009,000
First general mortgage, 5 per cent. coupon bonds	2,990,000
Total present funded debt	$15,442,000
The annual liability for interest on the funded debt at the present time being	1,040,202
To which is to be added the annual contribution to the sinking fund, which for the current year amounts to	49,000
Making the fixed charges	$1,089,020

"The earnings and expenses of the railway for the five months ending Sept. 1, the period operated by the company, as compared with the same period last year, have been as follows:

	1883. Gross.	1883. Net.	1884. Gross.	1884. Net.
April	$318,882	$128,892	$306,476	$153,225
May	319,379	64,488	312,756	56,444
June	307,118	63,533	257,134	43,440
July	300,689	60,338	282,202	74,115
August	470,442	172,729	353,708	154,727
	$1,714,510	$489,980	$1,512,276	$481,951
Decrease			$202,234	$8,029

"The failure of the wheat and corn crops of last year and the ruinously low rates of freight prevailing most of the spring and summer months—a portion of the time the rates being below the actual cost of transportation—had a marked effect on our earnings, the most rigid economy only saving us from serious embarrassment. It is gratifying to note that while in the time mentioned our gross earnings decreased $202,234, our net decrease is but $8,029.

"The crops along our line and in the country tributary are this season abundant and fully up to the average, but the general depression in business and the absence of seaboard and foreign demand has so far prevented the moving of grain in any considerable quantities. It is confidently hoped that the business of the fall and winter months will show a marked improvement, with good net results. The first-mortgage interest falling due on July 1, the second-mortgage interest Oct. 1 and the payment due the sinking fund Oct. 1, $24,000, were promptly met at maturity. The obligations of the Receiver assumed by the company, including the awards of $106,000 made to attorneys by order of the Court, have, with the exception of a few unadjusted claims, been paid by your Board.

"The physical condition of the road has been fully maintained. The repairs to the road-bed between Cincinnati and Aurora, necessitated by the disastrous flood of February, have been completed and charged to working expenses. The bridge over Shoal Creek was completed in July, and the bridge at Tanner's Creek will be completed this month. At both of these points new and substantial masonry was built, and the bridges are of the most substantial character. The bridge over the Muscatatak has also been rebuilt this season. It is not expected that any other renewals will be necessary for some years to come. One thousand tons of steel have been placed in the main line, and the light steel removed placed on the Springfield Division. Six and one-half miles of road have been ballasted this season, and 108 miles of the roadway fenced.

"Contracts were entered into in May with the Brooks Locomotive Works for 20 first-class ten-wheel freight engines. Thirteen have been received and placed in service, and the remainder will be delivered in October. The increased capacity of these engines will effect a decided decrease in expenses of conducting transportation.

"Contracts have also been entered into for 1,000 first-class large capacity box cars, the delivery of which will be commenced in November. This new equipment will be paid for from the proceeds of the 5 per cent. bonds. More freight equipment should be provided, to allow of an economical working of the road and save the large amounts paid annually for mileage on foreign cars.

"Our trains have been run with great regularity, and no accident has occurred resulting in the injury of any passenger. Our relations with all our connections continue of the most friendly character."

St. Louis & Cairo.

This company owns a line of 3 ft. gauge from East St. Louis, Ill., to Cairo, 151.6 miles, with the Columbia Branch, 9 miles, making 160.6 miles in all. There are 22.7 miles of sidings. The report is for the year ending Jan. 31.

Changes during the year were the addition of the Columbia Branch, which was opened for business Dec. 1, 1882, two months before the end of the fiscal year.

The equipment consists of 22 locomotives; 11 passenger and 5 baggage, mail and express cars; 334 box, 8 stock, 90 flat, 450 coal, 50 coke and 13 caboose cars; 7 boarding and 3 service cars.

The general account is as follows, condensed:

Stock		$6,500,000.00
Funded debt		2,600,000.00
Net income		219,853.46
Vouchers and accounts		24,598.05
Total		$9,344,451.51
Road, etc	$9,002,814.31	
Dividend account, income bonds	130,000.00	
Cash and accounts receivable	211,637.20	
		9,344,451 51

The funded debt is all of one issue, first-mortgage income bonds, receiving interest only to such amount as the net earnings may be sufficient to pay.

The traffic for the year was as follows:

	1883-84.	1882-83.	Inc. or Dec.	P. c.
Pass. train miles	178,936	139,510	I. 39,426	28.2
Freight train miles	213,567	167,574	I. 45,993	27.4
Total loco. miles	445,592	332,989	I. 112,603	33 8
Pass. car miles	524,845	445,325	I. 79,520	17.9
Freight car miles	3,618,931	2,694,505	I. 924,426	34 3
Pass. carried	125,539	127,417	D. 1,878	1.5
Passenger-miles	3,328,357	2,831,945	I. 496,412	17.5
Tons fr. carried	232,942	202,464	I. 30,478	15 1
Ton-miles	13,458,539	12,483,224	I. 975,315	7.8
Av. train load:				
Passengers, No	19	20	D. 1	5 0
Freight, tons	63	74	D. 11	14.9
Av. receipt:				
Per passen.-mile	2.790 cts.	3.125 cts.	D. 0.335 ct.	10 7
Per ton-mile	1.903 "	1.587 "	I. 0.316 "	19.9

Locomotive service cost 12.61 cents per mile. Passenger trains earned 51.2 cents per mile and freight trains 121.5. The average for all trains was 95.2; expenses, 72.3 and net earnings 22.9 cents per train mile.

The earnings for the year were as follows:

	1883-84.	1882-83.	Inc. or Dec.	P. c.
Freight	$149,203	$198,067	D. $48,864	24.7
Coal	110,307	77,142	I. 33,165	43 1
Passengers	92,812	88,531	I. 4,281	4 8
Mail, etc	23,462	18,557	I. 4,905	25.9
Total	$375,784	$382,297	D. $6,513	1.7
Expenses	295,827	227,341	I. 58,486	25.8
Net earnings	$89,957	$154,956	D. $64,999	41.9
Gross earn per mile	2,454	2,522	D. 68	2.7
Net earn. per mile	588	1,022	D. 434	42.5
Per cent. of exps	70.06	59.47	I. 16.59	....

The increase in coal earnings was largely due to the contract with the St. Louis Ore & Steel Co. Expenses were increased by damage from wash-outs at several points.

The result of the year was as follows:

Net earnings, as above		$89,956.57
Taxes	$11,119.04	
Interest (3 per cent.) on bonds	78,000.00	
		89,119.04
Balance, surplus for the year		$837.53

The net earnings were sufficient to pay 3 per cent. on the bonds, which are income bonds; in 1882 there was 5 per cent. paid.

During the year 1,000 tons of steel rails and 40,623 new ties were used; 143 ft. of bridging was replaced by new, 423 ft. of trestle bridge filled in, and other improvements were made. Two miles of track were raised above high water level, and the Rall's Ridge grade cut down.

The Columbia Branch to the coal fields of St. Clair County, 9 miles, was completed and opened for traffic Dec. 1. About the same time there was a general falling off in the coal business, on account of the stoppage of furnaces and iron mills.

A considerable sum is still needed for improvements and the building of an incline at Cairo to connect with the Texas & St. Louis road.

RAILROAD GAZETTE

Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

THE WEST SHORE AND THE NEW YORK CENTRAL.

The Receivers of the New York, West Shore & Buffalo Company last week began an aggressive movement, intended, no doubt, to secure a position for that road by weakening its chief rival, like all other movements in a railroad war which has been entered upon designedly. The West Shore wants to make a living. To do this it must get a share of the through traffic and of the local traffic on its line at profitable rates. The through traffic must be diverted from the other six trunk lines, but chiefly from those which carry mostly to New York. The local traffic must come mostly from the New York Central.

The securing of a through traffic depends very much on the allies that can be secured west of Buffalo. The road which has allies interested in sending freight and passengers over it at nearly every Western competing point has a great advantage over one that has no such allies, or has them at but few traffic centres. The West Shore has had a tenth of the through shipments from New York awarded it, and seems for the time satisfied with it; it has had but a very small share of the shipments from the West to New York; but it probably has no fault to find with the trunk lines on that account. The building up of a large through traffic is likely to be a slow process, when most of the railroads west of Buffalo are controlled in the interest of other trunk lines.

For the local traffic, the new road is not so dependent. It can secure as much as its merits will attract. Doubtless the West Shore was built where it is because the country on its line affords a larger traffic, perhaps, than any other of equal extent in this country. Its promoters may have reckoned that comparatively a small part of this traffic, at rates approximately the same as the low ones which the New York Central had been getting for carrying it, would suffice to pay the interest on the funded debt.

It was hardly to be expected, however, that the New York Central would permit so great a diversion of traffic if it could help it, or would fail to put obstacles in the way of a competitor which once fairly started was almost sure to become formidable. Prudence required that provision should be made for paying the fixed charges of the West Shore Company for two or three years after completion without depending on net earnings, because there might not be any, and if the company were absolutely dependent on them the New York Central was almost sure to see that there should be none.

We know, however, that the West Shore exhausted its financial resources before it was completed, and thus became dependent on its profits from the beginning; and before it was fairly completed the New York Central had ruined its chances of making anything out of the enormous local freight on the line by making rates which render the business undesirable to any line at least that does not handle an enormous amount of it.

It seems to us, however, that the new road should not have expected to make a very large income from the local freight from the beginning. The towns have grown around the New York Central during the forty years of its existence. It has its sidings into every merchant's and manufacturer's yard where they have been thought useful, and it has served these local shippers, on the whole, exceptionally well and at rates lower, probably, than those of any other railroad, forced thereto by the competition of a canal at every important station. But the new road would probably have been satisfied to get a small part of this traffic at the beginning, provided the rates were profitable. Probably it has actually obtained but an extremely small part of it, and made no profit on it whatever.

The traffic which it seemed might be very large immediately was the local passenger traffic. The West Shore was magnificently and largely equipped with passenger cars, and largely was the only one of these qualifying terms that could be applied to the New York Central. But, though the West Shore was probably better built than any other road in this country ever was when first opened, it had not the solidity of an old line, and as a matter of fact it had not the numerous very fast trains of the New York Central, and its trains frequently did not make the advertised time. Now a large part of the travel on the line is for long distances—150 to 400 miles—where the speed makes a considerable difference in the length of the journey; and the attractions must be great which will induce a passenger to New York from Albany, Utica, Syracuse, Rochester or Buffalo to spend from two to four hours more on the road than is required on the old route. Moreover, the large through travel of the New York Central as well as its great established local travel cause it to run very numerous trains, so that a passenger has the choice of many times of starting, which is a great convenience to many. A new railroad could hardly afford the expense of so many trains when it has not half passengers enough to occupy them.

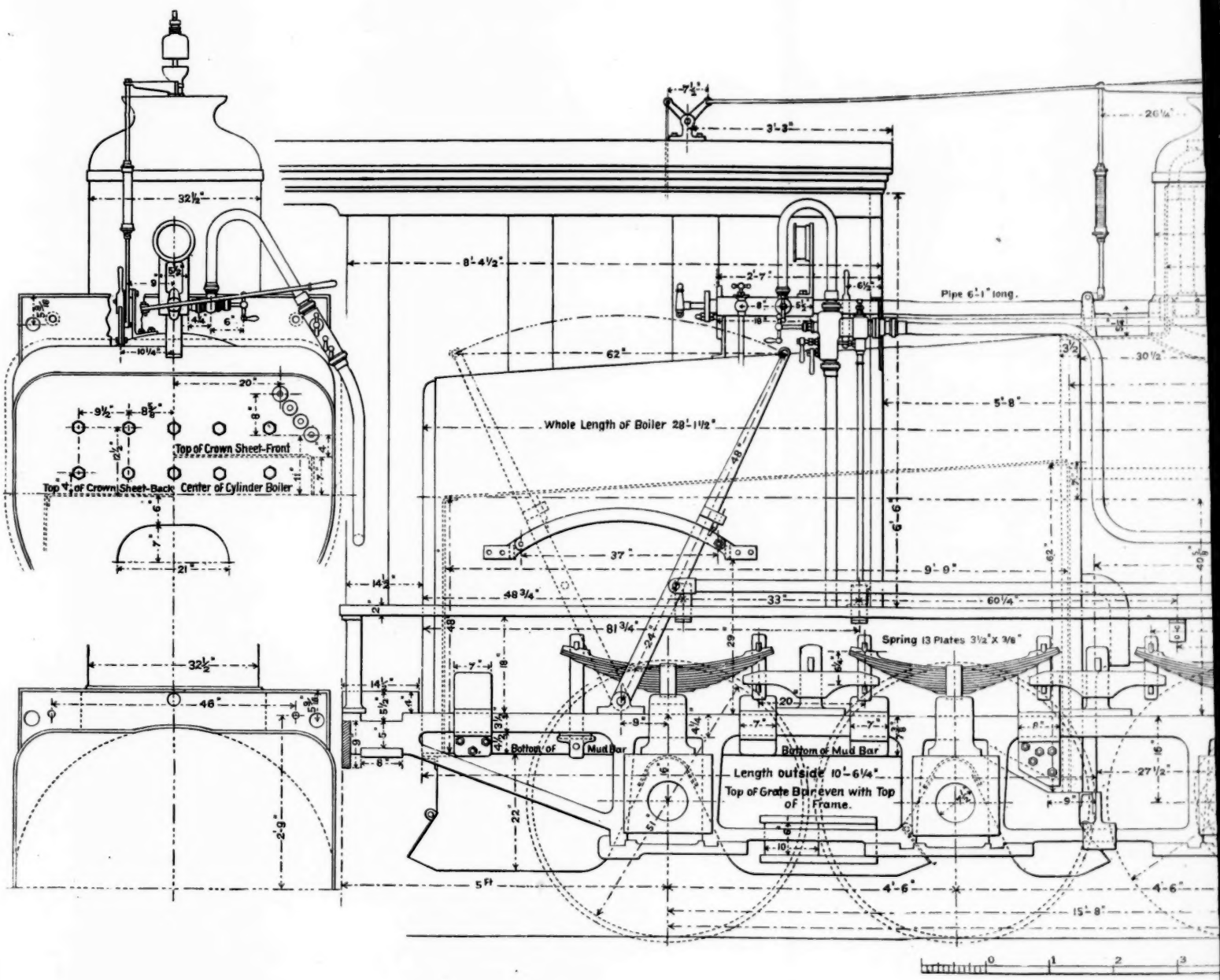
Now the West Shore having been built, whether wisely or not, and being opened through shortly after another new line between New York and Buffalo, and at a time when the tendency was for traffic to decrease rather than increase, the problem was to get profit enough to support it. Before it was fairly opened, its financial embarrassments were such that it could not hope to pay interest on its bonds for some time, and, passing into the hands of receivers who are to administer it for the benefit of its creditors, it was relieved of the necessity of such payments. Practically, the property now belongs to the creditors, who have been spared the necessity of united action, which it seemed very difficult to secure, by the action of the court in appointing officers to manage the property for the best interests of all concerned, with full power, apparently, to do everything which might be done by unanimous vote of the stock and bondholders, and entirely in their own discretion. The work for them to do is to make the property as valuable as possible for the benefit of all who may be decided to have an interest in it. They are not required to pay interest on any bonds, and they are substantially able, by the issue of receivers' certificates, which rank above all mortgage debts, to mortgage the whole property to obtain the means for doing what they may consider necessary to protect or increase the value of the property. This is a tremendous power, but it is given on the theory that the court should do whatever is necessary to protect the interests of the company's creditors, and these interests can only be protected by maintaining the permanent value of the road, and the court must act on the advice of the agents whom it has selected for their capacity in determining and effecting what may be for these interests. Substantially, the receivers are bound to act as a reasonable man would act whose sole property was that which the court has put in their charge, and who owned that property free from any lien. Under such circumstances a man would carry on a business at a loss, mortgaging the property to pay the losses, if in that way only could it be made profitable in future years. If a railroad is not worked at all, it not only will produce no income, but will depreciate rapidly in value, and it is entirely possible that a line, that is worked at a loss at first, may afterwards become very profitable; that is very likely to be the case when throughout its whole extent it is subject to the competition of lines which are financially strong while it is financially weak.

Now, the experience of the West Shore for the first few months after it was opened through resulted in a decided loss. The gross receipts were but about two-thirds of its bare working expenses during the ten weeks before the Receivers took possession. This probably was an unfavorable period, for the managers then were not able to make some needed improvements, because they could not give the security for payment which the Receivers give, and for a railroad with little business other than local passenger traffic it was an unfavorable season. Since the Receivers have had charge they have been able to make some improvements that tend to economy in working, and the season has been that of the heaviest local passenger traffic. It is, however, hardly probable that the road has made its working expenses.

Now what can be done? Even under receivers a railroad cannot go on forever paying out for expenses more than it takes in gross earnings. Receivers' certificates are good only as long as people believe that they will be paid without great delay. Nothing can compel people to take them for supplies or advance money on them to pay wages. When the amount outstanding becomes very large, they depreciate like any other security the time of payment of which is uncertain. It might seem that in the case of the West Shore the amount that can be issued without depreciation must be very large, because they are the first lien on a property that has cost tens of millions in cash; but no matter how much it may have cost, it will not be counted a good security, if after two or three years' working it continues to net a loss.

What under these circumstances do the Receivers mean by reducing, as they did last week, their local passenger rates one-half, this being, apparently, the only traffic, except west-bound through freight, on which they have been able to make any considerable profit? Do they expect by this to increase their profits? We do not suspect them of any such foolish expectation. Fares as they were on this and the New York Central Railroad were the lowest in the world. There is no instance on record, we believe, where passenger traffic of this class—substantially all first-class—has been carried *at an expense* as low as one cent per mile. Possibly if the West Shore could thus secure *the whole* of the New York Central travel, and had rolling stock on hand to accommodate it, it might not lose by the reduction—but probably it would. But, of course, the Receivers could not have expected this. They knew that their reduction would be met by a corresponding reduction by the the New York Central at every common point, and that their proportion of the total travel would remain about the same, and that their total travel would gain only by the stimulus of the lower rate, which is not likely, after the first few weeks, to double the travel; that is, the *gross* earnings at the reduced rate are hardly likely to be as great as at the old rate, while the net earnings will be less—probably nothing and less than nothing.

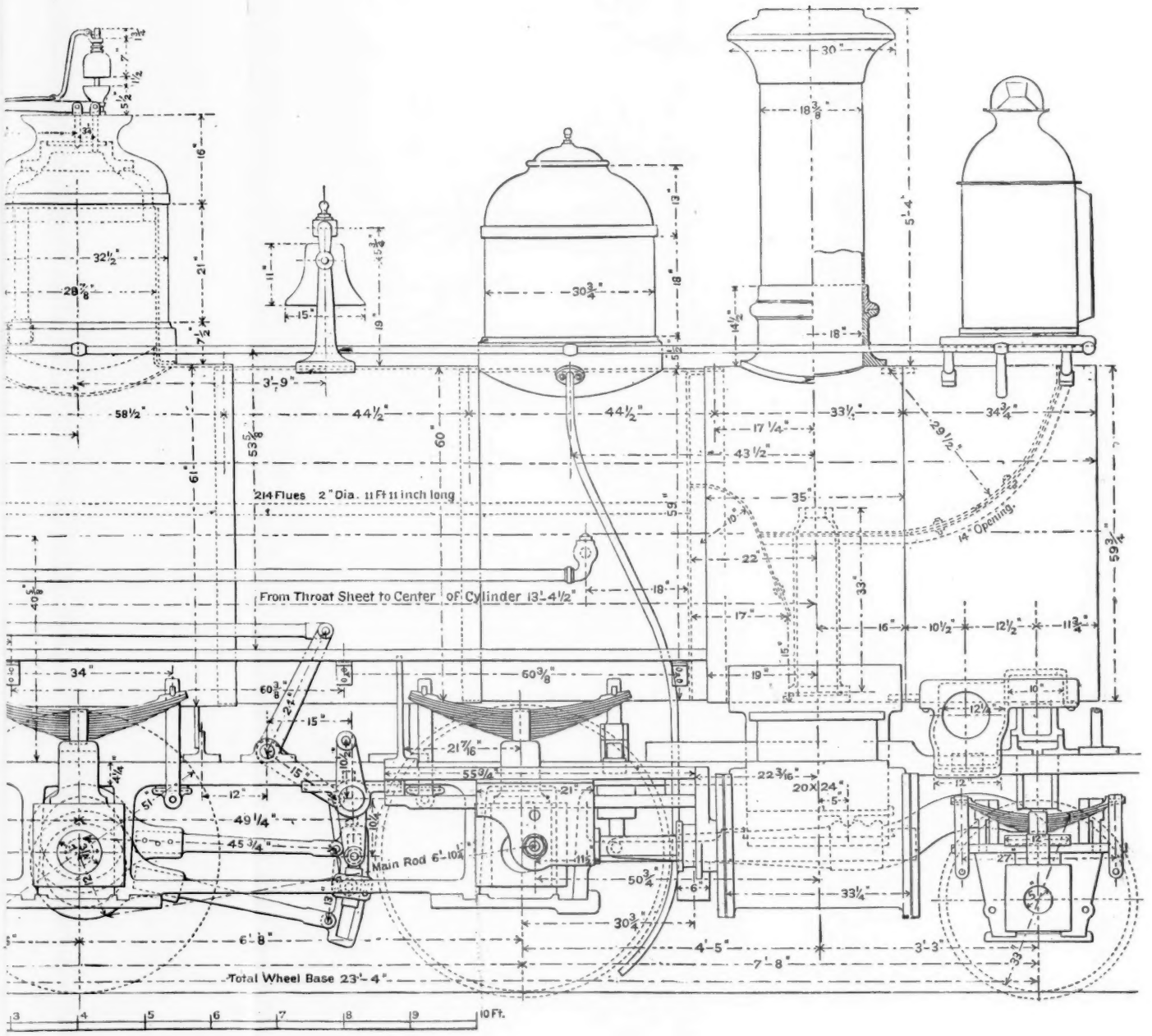
Now, doubtless, it is because the New York Central would have to follow its lead in reducing local rates, and because the reduction was likely to cause a great reduction in the net earnings from this traffic, that the West Shore Receivers made the reduction. As things stand, they are not able to make a living for their road; nothing is likely to enable them to increase their earnings or profits from through traffic much very soon: that must take time to grow. They had done what was possible, and with a fair measure of success, to secure local passenger traffic, but the way to getting any considerable profit from local freight was blocked by the unprofitably low rates made by the New York Central just before the West Shore was ready to compete for it. Now the people interested in the West Shore substantially say to the New York Central, If you will not let us make anything on the comparatively small part of the local freight which we might secure, you shall not make anything on the enormous passenger traffic which you have had so many years. Now the New York Central passenger earnings last year were more than $8,500,000. The reduction from 2 to 1 cent per mile just made by the West Shore, applied to the whole traffic would reduce them by $4,300,000—which is equal to $4.80 per share of stock. The competition of the West Shore does not affect the whole passenger traffic of the New York Central, it is true, because the New York Central works a large mileage besides the line alongside the West Shore; but this mileage is all near the West Shore, and the fares from most of the stations except those on the Harlem Division cannot be fully maintained when those from stations near by are reduced; and the whole through passenger traffic is affected, because the through rates on the New York Central



CONSOLIDATION ENGINE, WITH E

Designed by REUBEN WELLS, *Superintendent of Machine*

(For description see page 70



TH BELPAIRE FIRE-BOX.

lachinery, Louisville & Nashville Railroad.

page 782.)

were as high as its very low local rates, and the through rates cannot be made more than the "sum of the locals," as passenger men say.

As in every railroad war, the road with the greatest traffic suffers the greatest losses. The West Shore, possibly, by working its passenger traffic at a loss of half a million a year might impose a loss of two or three millions on the New York Central, whose traffic is many times as great. If one road can be worked much cheaper than the other, that will make some difference; but it is not probable that the West Shore, with its comparatively light traffic, can be worked as cheaply per unit of traffic, at least for passenger traffic, as the New York Central, with its very heavy business.

Now the outcome of a contest like this depends upon endurance. The New York Central has so much profitable traffic that the West Shore cannot spoil, that in all probability it can go on indefinitely carrying at current rates by sacrificing its dividends, for its funded debt is light and not heavy. Moreover, it is just as legitimate for it to borrow money to sustain itself through such a contest as it is for the West Shore to issue receivers' certificates for the same purpose. If it should do so, the West Shore would finally become the property of the holders of the receivers' certificates the interests of the present creditors would have been wholly sacrificed in the effort to protect them, and the policy of the Receivers would turn out to be a great failure. But the question with the New York Central is, Is the game worth the candle? and the answer to this depends on the TIME required. The West Shore would remain after all. Its power as a competitor will only be destroyed by purchasing it. It can be bought at a very low price if it fails to sustain itself in the Receivers' hands; but this would not make up for the losses caused to the New York Central by a very long struggle. It is not those alone by the low passenger rates just made by the West Shore which must be considered, but also those by the low local freight rates established months ago by the New York Central itself. The West Shore can be bought now for a fraction of its cash cost. Doubtless an arrangement could be made with it on the basis of a division of traffic which would immediately increase the profits of the New York Central, but that could hardly prevent trouble breaking out again. It is not probable that either party expects that things will remain as they are until the actual ruin of either or for many months. If the West Shore manifestly grows weaker and the New York Central sustains itself well, West Shore bonds will go down and a controlling interest will probably be purchased in the interest of parties who will work it in close connection with the New York Central and perhaps other trunk lines. If the West Shore seems able to continue the contest long, then the same purchase may be made at a much higher price, or an arrangement may be made for the independent existence of the West Shore—an arrangement which we believe could not last long. More light will be thrown on the situation when we have the reports of both roads for the year ending with September last, which will enable us to see how great additional losses the New York Central can bear, and what relation the expenses of the West Shore have borne to its earnings during recent months.

German and American Freight Traffic.

The detailed freight statistics of German railroads for the year 1883 have recently been published. They do not include quite all the roads, it having been a voluntary matter for the companies to furnish them. But the slight omissions have no importance for our present purpose. The tables of tonnage of different articles carried give us an insight into the character of German freight business to-day. The classification is much more detailed than that of the United States census returns, being divided into some 75 different heads. We have tried to group them in such a manner that the two may be compared. We have reduced the metric tons of 2,204 lbs. to our tons of 2,000 lbs. to make comparisons easy. Live stock in Germany is kept separate from freight; we have therefore deducted it from the United States returns:

	Germany. 1883.		United States. 1880.	
	Tons moved.	P. c. of total.	Tons moved.	P. c. of total.
Aggregate	100,769,937	100.0	280,083,176	100
Coal 44,083,099				
Peat and lignite. 5,719,040	49,802,139	49.4	89,622,899	23.0
Brick 6,220,946				
Iron ore 4,175,013				
Earth 2,177,833				
Lime 902,458				
Stone, ore, cement, etc 1,434,037	14,910,287	14.8	9,000,822	3.2
Potatoes 1,226,664				
Other root crops 3,102,071				
Sugar 1,199,898				
Other food supplies 1,278,873	6,807,506	6.8	7,090,525	2.5
Wheat 1,685,822				
Rye 1,443,853				
Barley 738,726				
Oats 645,438				
Other grain 871,375	5,383,214	5.3	42,003,504	15.0
Fire wood 1,980,889				
Sawn lumber 1,836,164				
Unsawn timber 1,223 845				
Other forest products 120,893	5,161,791	5.1	25,474,349	9.1
Unmanufactured iron 3,250,773				
Railroad iron 638,378	3,889,151	3.9	11,663,372	4.2
Flour	1,439,083	1.4	7,449,717	2.7
All other freight*	13,376,769	13.3	87,769,688	31.3

* Not including live stock.

Under the last general head are included four of the United States census classes, viz., "Petroleum," "Cotton," "Manufactures," and "Merchandise." Of the first two the German railroads carry comparatively little; the two together form but ⅛ of 1 per cent. of the total tonnage. Manufactures and merchandise it was impossible to separate in such a way as to correspond even roughly to the division in the United States census. Indeed, it was sometimes difficult to decide which of the German returns should be included under the head of "food supplies." Considering the way in which the traffic was handled, it seemed best to classify peat with coal rather than with earth.

Comparing the percentage results in the two cases we find that coal heads the list in both countries, but is relatively far more important in Germany, forming nearly half of its tonnage, and less than one-third of ours. Second in its list stands a class of traffic which in our statistics appears absolutely quite unimportant—stone, earth, etc.—constituting nearly 15 per cent. of the German traffic, and little more than 3 per cent. of that reported in our census. As our population is considerable larger than the German, and the amount of building going on is enormously greater here than in Germany, it is not easy to believe that these figures are correct. And as "earth" makes a considerable item in the German construction materials, we are led to suspect that materials for railroad construction were included in the German figures and not in ours. They certainly could not have been included in ours, for we built about 7,000 miles of railroad in 1880, and had ballast, etc., to haul for 85,000 miles of old road, and this alone required doubtless more than the 9,000,000 tons reported by the Census of all building materials, iron ore, etc.

Potatoes and other vegetable food, exclusive of grain, come third in Germany. The actual tonnage is not very much less than with us, while its percentage of the whole amount is nearly three times as great. It is probable that certain things, sugar, for instance, which are here classed with potatoes, are classed as merchandise in the United States census; but this can only account for a part of the difference. Grain, which with us stands second only to coal, in Germany ranks fourth. The percentage is little over one-third of our own, and the aggregate less than one-eighth. It is somewhat the same way with flour, but the difference is not quite so marked. Lumber is somewhat more important with us; in iron the difference is very slight. There are some rather curious things which do not appear in the summary. For instance, the tonnage of meat is only 21,988 or less than one-fiftieth of 1 per cent. of the whole in Germany, where much less meat is eaten and comparatively a small part of it has to be shipped further than a cart can haul it.

The unclassified goods—merchandise, manufactures, etc., are much more numerous in the United States, forming 31 per cent. of the whole while in Germany they are only 13 per cent. If we deduct the shipments of cotton and petroleum (4 per cent. of the whole), we still have twice the proportion of miscellaneous shipments that there are in Germany. Part of this difference is probably due to the fact that their figures are more carefully set apart; and it is not improbable that many articleswhich in Germany appear as "provisions" or "iron" are returned by us as "miscellaneous." But making all possible allowance for these differences, there must still be really more distribution of manufactured articles in this country. Unless the figures are utterly erroneous, they show that the American manufacturer or merchant extends his sales on a much larger scale, and depends far less upon the local market; or, to put it in another way, that a much smaller portion of the finished product is consumed at the place of manufacture, as is naturally the case when many manufactures are confined to one or a few sections of the country, instead of being scattered pretty well over it, as they are in most old countries, and as they had to be when the means of transportation were very imperfect.

We should say, however, that the statistics, for this country at least, are very imperfect. Each of our railroads reported the whole number of tons of each kind of freight hauled by it, though in many cases the same ton of freight, unchanged in form and, indeed, without transfer from one car to another, passed over several different roads. A shipment of ten tons from Kansas to Boston in many cases must have been reported by seven different roads and so would foot up as 70 tons. We believe that care was taken in Germany to avoid this, the statistics, indeed, having been obtained to show the movement of different kinds of goods from one district to another. But this tends to decrease the absolute quantity of freight passing over the American roads. There can be no doubt that *the amount of transportation* was in proportion to the number of tons handled much the greater here, because our routes are longer, and comparatively few shipments in Germany are made over routes, including those formed by several roads, as long as ours from Kansas City, Council Bluffs or Minneapolis to Chicago, from Chicago to Buffalo or Pittsburgh, or from Buffalo to New York. Ton miles are the only criterion of the amount of transportation, and of these there were 32,349 *millions* by our census, and but 9,298 millions over the German railroads in 1880–81, the average distance hauled being 112 here and 51 in Germany. The number of things transported it is also important to know, but our census gives very imperfect information of these (because the same thing is often reported several times), while the new German statistics are probably quite correct.

We have discussed the contest between the West Shore and the New York Central elsewhere entirely as an economic question, without reference to its moral quality. As regards the latter, it is easy to justify both parties. The managers of both roads are bound to do the best possible for the proprietors of the railroads committed to their charge. If the New York Central could prevent the West Shore from ever making a dollar of profit, without loss to itself, it would be justified in doing so; if it can make it so valueless that it can buy it cheap for the benefit of its own proprietors, it is justified in doing that. It owes the West Shore absolutely nothing: its conduct toward it should be guided by the ultimate effect on the income of the New York Central Company. When the West Shore built its road by the side of the New York Central it took the risk which every new business takes of being ruined by its competitors.

And so with the West Shore. If by any effort of theirs its managers could divert every dollar of profit from the New York Central treasury to their own, they would be bound to do it. As railroad companies are established and managed under our laws, none possesses any rights in traffic or profits as against rivals. Each is liable to fight for its existence, and the contests can be judged only by the rules of war in uncivilized communities. The tribe that first occupies a fertile valley owns it just so long as it can outfight every intruder; and, burdened by its very wealth and the care of women and children, a rich and powerful tribe may have to yield part or the whole of its domain to a poverty-stricken band of desperate adventurers who have nothing but their lives to lose and are reckless of them.

Curiously like war are such contests between railroads. Maneuvres are successful in proportion to the amount of damage they do the enemy compared with our own loss. The company which is in position to make rates so low as to ruin the value of a traffic at a place where its business amounts to $10,000 a year and its rival's to $100,000 has an enfilading fire on its enemy. The one with a large income and light fixed charges can endure great losses and hold out long, like a wealthy and populous nation.

All this is essentially barbarous—railroad war and national war alike; but it is very hard to see how the former can be prevented without a radical change in the legislation under which railroads are organized, such as few of those who most deprecate the evils of railroad wars would be willing to make. Probably railroad policy will slowly become civilized—or half-civilized—and we may at least expect to see the last railroad war before the nations of Europe disband their armies.

The West Shore's reduction of its passenger rates to 1 cent per mile is the first instance on record, we be-

lieve, of a railroad war affecting *the whole* of the passenger traffic of a railroad, this being, indeed, probably the only railroad in the world which has a competitor at substantially every station. The amount of damage that it can do to its chief competitor is fearful, but it will also cause no little injury to the Erie, for the few places where they come in contact are important ones, and the Delaware, Lackawanna & Western must suffer also in its Buffalo business, not to speak of the effect on the through passenger business of all the trunk lines. Probably the West Shore aims only at the New York Central. It hits the other roads only because they happen to be in the line of its fire.

It is remarkable how much more the public, including those who buy and sell railroad stocks, is impressed by a contest of the railroads over through passenger rates than by one over freight rates which causes ten times as much loss. The reduction of all passenger rates, through and local, by the West Shore compelled a reduction in the regular price of through tickets, because you cannot get *more* for a through ticket than the cost of two local tickets which cover the same journey; and when it costs only about $4.50 to go from New York to Buffalo and $10 or so to go from Buffalo to Chicago, people will not pay $16.50 to $18 for a ticket from New York to Chicago. This is the explanation of the reduction in the prices of through tickets sold at the railroad companies' offices. The reduction in their average receipts is probably much less. Before this open reduction they were selling scarcely any tickets at their own offices, but nearly all through brokers, to whom they paid a commission of $4 or $5 on a Chicago ticket. Now that the railroads have been compelled to reduce the price at their own offices they pay probably much smaller commissions, and moreover sell many more tickets through their own agents. Thus the loss by the reduction falls on the scalpers more than on the railroads probably. The difficulty between the Pennsylvania and the Baltimore & Ohio has apparently not made much difference in the situation, except to enlist in the service of the West Shore the whole force of Baltimore & Ohio agents. On the other hand, the ticket-brokers, having had their harvest injured by the West Shore's action in reducing rates at railroad offices, probably work against that road. Through fares are still much higher than they were in 1881, and the loss by the present condition of things, though large, is not nearly as great as would have resulted from the demoralization of east-bound freight rates, if that had continued.

Concerning these through east-bound freight rates, there have been many reports that they continued to be cut through last week, and railroad men elsewhere have been much concerned about it, there being, apparently, a disposition to believe that almost anything of the kind is probable. But the most thorough investigation on the spot fails to discover any foundation for these reports. All the Chicago railroads in the pool affirm positively that they are taking nothing at less than the regular rates; and all their shipments are reported and charged to them at full rates; and if any gets more than its share, at any rate, it will have to pay over the *gross* earnings from the excess to those who are short. A small amount of freight is going out of Chicago by a circuitous route outside of the pool, but it is not enough to make any trouble. As to reports of contracts made for carrying for six months at 15 cents per 100, if they have any foundation, it is probably in connection with a contract which a Chicago car-works has to construct and deliver a large number of freight cars for an Eastern railroad. The manufacturers will have to pay freight for hauling the cars empty, and they can probably earn car mileage on them and have no freight to pay if they are sent loaded; and in this way they may be able to make a rebate from the regular rate on shipments enough to fill these cars, by a route outside of the Chicago pool, down to the time when the last car is turned out of the works. But they can carry but an insignificant fraction of six months' business—probably not half of one week's shipments. But this is enough to give a foundation for an alarming report, which shippers who are anxious to see rates go to pieces circulate industriously, and which, at a time when there have been so many disturbances, railroad contracting agents are apt to accept as at least not improbable.

It is without doubt true that during the week ending Oct. 11 the shipments were largely and chiefly at the low rates made during the recent disturbances. But, as we have shown elsewhere, last week there was a very great falling off in the shipments, and we understand that in the last half of last week the shipments were much smaller than in the first half, and decidedly small, so much so as to show that, if the rates had been cut, the cutting had had no effect.

It is one of the difficulties of a situation like the present, when some rates (as on through passengers) are known to be demoralized, and when very recently there has been a cutting of freight rates, that traffic men distrust each other and easily believe reports of fresh irregularities, and this disposition adds to the difficulty of maintaining rates.

Through shipments of freight from New York to the West, which kept up wonderfully well during the first half of this year, are now, and have been for some three months, smaller than in any other year at this time since 1880, though the decrease since last year has not been great—since August only about 5 per cent., which, considering the general complaint of dull business, seems very little. There is only one more road than last year competing for the traffic, and that is getting a smaller share of the traffic though a much larger share of the earnings than it had last year at this time, when it was making itself felt very sharply and carrying a great deal of low-class freight at probably 20 per cent. less than the regular rates. But compared with years previous to 1883, the four old trunk lines are getting but 77.4 per cent. of the total traffic, which total is a little less than in 1882, and much less than in 1881, when low rates made it valueless, however. *Their share* of the shipments now is about the same amount as they were getting in 1880 and 1879, at this time, however, when the business was much better than it had ever been before. But the principal significance of the New York shipments is as an indicator of the ability of the country to purchase goods. That it should be getting so much when there is so much complaint of bad trade seems surprising, and leads to the suspicion that the badness of trade consists more in the smallness of profits than in any great reduction of sales. It may be, however, that the tonnage is kept up by larger shipments of coarse, cheap goods, in spite of a considerable decrease in the costlier merchandise; and it is true that in a country like this a cessation of growth produces many of the effects of an absolute decline in older communities. There are more factories, more merchants and more railroads year after year, and if there is only just as much business, there is less for each individual competitor.

The farmers continue to market their wheat more rapidly than in previous years. During the 11 weeks ending Oct. 11 the Northwestern receipts of flour and wheat for four years had been:

	1884.	1883.	1882.	1881.
Flour, bbls....	2,069,634	1,914,569	1,830,674	1,937,354
Grain, bu.....	36,656,595	28,557,518	30,690,022	17,375,444
Total, bu...	45,969,948	37,173,078	38,950,555	25,093,577

Last year there was a light crop but a large surplus from the previous year; in 1882 there was a very large crop—probably quite as large as this year east of the Pacific slope—but the old crop was nearly exhausted. Stocks were low at the beginning of this crop year also. It appears that the receipts were 24 per cent. more than last year, 17½ per cent. more than in 1882, and 80 per cent. more than in 1881.

That this is a substantial portion of the crop to be marketed at these places is indicated by the following statement of their flour and wheat receipts for the whole of the last eight crop-years (ending with July):

Year.	Bushels.	Year.	Bushels.
1876-77	64,147,180	1880-81.....	122,185,530
1877-78.....	107,237,498	1881-82.....	85,243,807
1878-89.....	121,950,129	1882-83.....	117,000,905
1879-80.....	122,367,266	1883-84.	111,741,222

Thus in the years of heaviest movement, the Northwestern wheat receipts have varied little from 122 million bushels for the whole year. This year the Northwestern markets have received 37⅞ per cent. of that amount in the first 11 weeks, which is but 21 per cent. of the year; and the receipts in that time have been 39 per cent. of those of the crop-year after the harvest of 1882, which was till this the year of largest production.

While the high prices of the corn corner in Chicago last month did not bring out much corn, evidently they brought out most of what there was ready to ship, as may be known by the fact that while the receipts at Chicago in the week ending Oct. 4 were 2,173,647 bushels, in the following week they were but 863,651 bushels, which is little more than half as much as in the September week of smallest receipts. As before, nearly all of it (81¼ per cent.) went to Chicago.

The exports of hog products continue to testify to the loss of this country by reason of three successive light corn crops. They were smaller last September than in any other September since 1875, and for the nine months ending with September they have been for eight years, in pounds:

Year.	Pounds.	Year.	Pounds.
1877.....	539,182,474	1881.....	728,359,145
1878.....	830,871,962	1882.....	502,937,271
1879...	888,598,167	1883	581,863,208
1880.....	978,250,711	1884.	439,762,768

Thus the exports were less this year than in any other of the eight, 24 per cent. less than last year, and 55 per cent. less than in 1880, when they were largest. This very great change has made a considerable difference in the national income.

The wheat receipts of the Northwestern markets were larger in the week ending Oct. 11 than in any other week of the year, though the increase over other recent weeks was not very large. The arrivals at the different markets do not indicate an increase in the amount of spring wheat marketed, however, for the chief part of the gain was at Toledo, and there was some increase at Detroit, but none at Duluth, and a decrease at Milwaukee. Detroit's receipts were the largest in its history, and Detroit and Toledo together received 1,719,207 bushels, which is 43¼ per cent. of the whole. Toledo received more than any other place. The St. Louis receipts were small, as they have been for three weeks.

The Central Pacific has begun making monthly statements of working expenses and net earnings as well as gross earnings at a time which certainly was not selected because it was one of exceptionally large profits. For the eight months ending with August the earnings and expenses were:

	1884.	1883.	Inc. or Dec.	P. c.
Gross earnings.....	$14,385,503	$15,848,886	— $1,463,383	9.2
Expenses.....	10,469,496	10,254,780	214,716	2.1
Net earnings.....	$3,916,007	$5,594,106	— $1,678,099	30.0

The working expenses were 70¼ per cent. of the earnings this year and 64¾ last year. There has been some increase in working expenses in spite of the great decrease in earnings, so that the decrease in net earnings is at the fearful rate of 30 per cent.—equal to $2.83 per share of the company's stock, or at the rate of $4.25 per year.

For seven successive years the company's earnings and expenses in these eight months have been:

Year.	Miles.	Gross earnings.	Expenses.	Net earnings.
1878.	1,941	$11,026,586	$5,317,659	$5,708,927
1879..... ...	2,230	10,870,700	6,815,015	4,055,685
1880....	2,467	12,318,199	7,671,160	4,647,039
1881.....	2,707	14,877,791	8,667,198	6,210,593
1882..... ...	3,041	16,583,175	10,525,997	6,059,178
1883.....	2,998	15,848,883	10,254,780	5,594,166
1884.....	3,003	14,385,503	10,469,496	3,916,007

The gross earnings this year are the smallest since 1880—$492,000 less than in 1881, though 300 miles more road are worked now. The working expenses have not declined with the earnings, but are larger this year than ever before, and the net earnings are not only 30 per cent. less than last year, but 35 per cent. less than in 1882, 37 per cent. less than in 1881, 15 per cent. less than in 1880, and even less than in 1879, when they were exceptionally light and when one-fourth less road was worked; while in 1878, since which time there has been an increase of 1,060 miles (55 per cent.) in length worked, net earnings were 46 per cent. more than this year.

This has been in some respects a very unfavorable year. Aside from the total diversion of the important Oregon and Washington traffic to the new Northern Pacific, one of the great main lines of the Central Pacific was interrupted repeatedly and for long periods by great floods. On the face of the figures it would appear as if the great additions made to this system of late years had resulted only in decreasing earnings and increasing expenses, and in a very serious decline in profits, but the circumstances have been peculiarly unfavorable this year.

The St. Louis & Cairo Railroad seems to be having a hard time in getting itself established. This is one of the railroads built during the narrow-gauge craze which was to be so cheap to build that it would have to pay interest on but a small amount of capital, and so cheap to work that it would have great profits to pay this interest with. It was not so very cheap, its capital when completed being at the rate of $51,200 per mile of road, of which $17,000 was bonds. We believe that never in any year did the road earn all the interest on these bonds, and when the company was reorganized in 1881, there were $1,350,000 of unpaid coupons outstanding on a principal of $2,500,000. The report of the Illinois Railroad Commission for the year ending with June last shows that its net earnings were only $68,901 then ($430 per mile), against $105,702 ($660) the year before, being last year at the rate of 2.65 per cent. on the bonds of the reorganized company, which represent $3,850,000 of bonds and coupons of the old company.

As to the cheapness of working, we find that the expense per traffic train-mile in 1883 was 95 cents,

which may be a little less than on most railroads, but not much; as the average expense per train-mile on the New York railroads during the year to Sept. 30, 1883, was $1.02½, and by the census of 1880 the average for the whole United States was 92 cents, while the train-load was certainly much less than the average on the St. Louis & Cairo, being:

Average train-load:	St. L. & C.	All N. Y. roads.	All U. S. roads.
No. passengers	18⅞	55⅛	44¾
Tons freight	67	175	129
Expense per train-mile	$0.95	$1.02½	$0.92

Assuming the expense to have been twice as much per passenger mile as per ton-mile, it cost 1.41 cents to carry a ton and 2.82 cents to carry a passenger one mile. On the standard-gauge "Cairo Short Line," which is parallel with and even shorter than the St. Louis & Cairo, the expense the same year, calculated in the same way, was 1.206 cents per ton and 2.412 cents per passenger mile, on the New York railroads it was 1.55 cents per passenger and 0.65 cent per ton per mile, and on all the United States railroads in 1880 by the Census it was 1.71 cents per passenger and 0.76 cent per ton. The Cairo Short Line, it is true, has the advantage of a much larger traffic, 2½ times as much passenger mileage and 50 per cent. more ton mileage, and this helps it to keep down its expense per unit of traffic; but its gauge certainly helps it to secure this larger traffic.

A Work on Train Dispatching.*

This little work, it appears, was published last year, but for some reason has not come to our notice until now. Age does not spoil it, however, for it concerns a vital subject, and is written in clear, concise language and arranged in a business-like manner—features which make its reading a pleasure. We know of no work which affords anything like the exact and comprehensive view of the science of "train-running" that Mr. Anderson has here given, and it is fortunate that a field in which there is so little competition should be worked by so experienced and conscientious a hand.

The captions of some of the chapters indicate the helpful manner in which the matter is arranged, as, "The Dispatcher"; "The Operator"; "The Order"; "The Manifold"; "The Record"; "The Signal"; "The Transmission," etc. The chapters embracing the body of the discussion are supplemented by examples of all the principal *forms* of train orders, accompanied by useful comments covering a great variety of fine points in the science treated of.

After the first chapter, which discusses the general subject, and in which Mr. Anderson advances strong arguments in favor of the double order system, which he has used *twenty years*, over the single, he turns to "The dispatcher," in which chapter he says very decidedly, as we should expect he would, that this officer should be a first-class operator and be enabled to devote himself *exclusively* to the care of the trains.

In discussing "The operator," the author recognizes the tendency, which seems to prevail everywhere, to pay small salaries and thus crowd the experienced operators out of the service, but does not essay to tell us how to discover "the exact balance between economy of expenditure and security in management." "The order" is carefully discussed, the conclusion being reached that a separate order should generally or always be given for each transaction. The right use of the manifold process requires sound operators, and they should be insisted upon, Mr. Anderson says. He says the *signal* should be a semaphore, and be kept normally at danger; assuming that this plan meets the approval of substantially every body. The signal should have an attachment for holding papers, so arranged that when orders for a train are on hand they can be placed where it will be impossible for the operator to pull down the signal without *seeing* the message. We are glad to see that the author's strictly practical ideas are relieved by a touch of esthetic-ism, as is evidenced by his recommendation that the "signal should be an adornment rather than a disfigurement to the landscape in which it forms a prominent feature."

"The transmission," Mr. Anderson divides into ten stages, elaborating a safe plan in a very clear manner. He has the dispatcher give two distinct formal acknowledgments; first, "O. K.," to approve the wording of the operator's copy, and then "Correct," to approve its delivery.

Mr. Anderson, as we said, has used the duplicate order system for twenty years, and advances arguments in its favor which are strong, and, we think, conclusive. He seems to be unusually free from prejudices and one-sided views, and yet his long experience has only confirmed the opinions he formed in the beginning on this point. The double order system makes it necessary to use the third person instead of the second; instead of saying to each of two or more men, "*you* must" do so and so, we have to address *the language* to nobody in particular, saying "*they* will" do so and so. This is a loss of force; but it is undoubtedly outweighed by the manifest advantages in other directions. The suggestion that the methods of single-track dispatching could be profitably applied to some departments of double-track working is good, and we believe has been put in practice on some Western roads with satisfactory results. As the author says, men who are habituated to double-track working exclusively lose (if they ever possessed) the quick-mindedness and skill necessary in successful single-track working; and the more common use of telegraphic orders would keep them trained to a better degree of alertness, so that in sudden emergencies it would not be necessary, as sometimes happen now, for a double-track superintendent to send a dozen messages to get a passenger train past a single wreck, thus giving his road the questionable reputation of being less skillful in handling trains than its obscure neighbors who labor under the disadvantage of a single track. Mr. Anderson says with truth, that expenditures for third and fourth tracks might very likely be considerably postponed in many cases by the judicious use of the telegraph as an aid to the economical use of the present facilities.

The author says work-trains between stations should be guarded by flagmen and that regular trains should be notified to look out for them. This notification is meant, doubtless to be merely precautionary, but we believe the principle is wrong and that it is sometimes the cause of collisions. The right plan, in principle, is to have every train run at such a speed that it can be stopped within a *certain distance*, and to have the flagman always sent to or beyond that distance; so long as trains are notified to "look out," the flagman is liable to take advantage of the fact and relax his vigilance more or less; and, on the other hand, too much pains taken to tell enginemen where they are to encounter flags tends to induce in them a habit of expecting them only when warned.

Perhaps, however, it is not exactly fair to criticise on this point, as it may be called, so far as train-dispatching is concerned, a side issue; and the author's ideas do not purport to be anything more than individual opinions in any case. His views and arguments on the main question are very fair and judicial in their tone, even if they are individual expressions; and young operators, inexperienced enginemen and others whose reputation depends on their faithful and precise performance of duty in this department of railroad work, cannot do themselves a better service than to carefully read this book.

The immediate problem, though, after all, is to secure the necessary appropriations to carry into effect the excellent ideas which are the fruit of the experience of thoughtful and practical men like this author. He elaborates theories which are admirable from a scientific point of view; but boards of directors are so severely "practical," or, more exactly, empirical, that thousands of miles of railroad are still managed on the hand to mouth method (as regards the handling of trains), and the author states but the truth when he says that "the value of the telegraph is not as yet sufficiently realized, and hence its capabilities for usefulness have not been developed to an extent commensurate with its importance." Scientific dispatching is necessary, he says, because, among other things, "machinery breaks, storms disturb * * * and a thousand things cause delays;" but the hard-headed financiers who ought to provide for these things turn their attention very assiduously to the *hundred thousand* instances where everything runs smoothly, and so do not take such a very lively interest in the first-mentioned thousand.

We wish Mr. Anderson had given his views on the propriety of having orders always acknowledged by the superior train before being delivered to the conductor of the inferior. This is a vital question in train dispatching, and one which is coming more and more to the front. Many of the more conservative managers require the observance of this rule more or less strictly already, and it is destined to be more widely adopted.

* *The Train Wire.* A discussion on train-dispatching, by J. A. Anderson. Chicago, The Railway Age Publishing Co.

The Arlberg Tunnel.

Austria is about celebrating the completion of the Arlberg Railroad, from Innsbruck over or rather through the Tyrolian Alps to the Lake of Constance in Switzerland, an enterprise undertaken by the Austrian government, chiefly, doubtless, to give a more direct connection with Switzerland, which is a large consumer of Austrian and Hungarian grain and other produce, but also to give it a connection with France and Western Europe generally independent of Germany. It will, in connection with the Swiss railroads, form the most direct route between Austria and indeed all Southeastern Europe, and Southern France.

The railroad was one of the most difficult to construct that has ever been built, and a great deal of pains were taken in locating and designing it, nearly all the eminent engineers in the Empire, apparently, studying and discussing it, and many submitting plans for it. It passes through some of the most magnificent mountain scenery reached by any railroad, and besides the usual concomitants of a mountain railroad, rock cuttings, bridges over torrents, and tunnels, galleries had to be provided for protection from avalanches, as on the Central Pacific Railroad. A bridge of 400 ft. span carries the road over the Trisana 280 ft. above the torrent. Steep grades also were required, the line rising 2,152 ft. in 15½ miles on the western side of the summit tunnel, requiring long grades of 160 ft. per mile. On the eastern slope 132 ft. per mile is the steepest. The maximum curve is seven degrees.

The works are constructed for a double track throughout. The winter lasting seven months, and the temperature often falling to 30° below zero, and the snow storms being frequent and severe, the line invariably follows the sunny slope of the valley.

The greatest engineering feature of the line is the great tunnel, the third longest in the world, and incomparably the most quickly completed. Commenced in June, 1880, it was pierced in November, 1883, considerably under the contract time, the contractors receiving a premium of $330 a day. The bottom heading was cut first on the floor line and enlarged. The top heading was cut first on the St. Gothard, but the quicker progress of the Arlberg Tunnel amply justify the change. The rails at the summit in the tunnel are 4,372 ft. above the sea.

The following table, which gives some particulars of the four longest railroad tunnels in the world, shows what advances have been made in the art of tunneling, the time and cost having been both materially reduced. The enormous height of the mountains above the Alpine tunnels precluded the use of shafts, while several shafts were used in the Hoosac Tunnel, thus increasing the number of working faces.

TABLE NO. I.

THE FOUR LONGEST RAILROAD TUNNELS.

Name of Tunnel.	Location.	Length in miles.	Years under construction.	Cost.	Cost per running ft.	Maximum advance heading in one year.	Date completed.
						Feet.	
Hoosac	Massachusetts	4¾	22	$10,000,000	$399	4,456	1876
Mont Cenis	Savoy Alps	7⅞	14½	15,000,000	356	5,365	1871
St. Gothard	Swiss Alps	9¼	9¼	11,175,000	229	8,235	1881
Arlberg	Tyrolese Alps.	6⅞	5	7,300,000	154	11,775	1884

The lengths of the next longest railroad tunnels in the world are given below:

TABLE NO. II.

Name of Tunnel.	Where situated.	Length in miles.	When completed.	Cost.	Cost per running ft.
Severn	England	4⅜	Not yet.	....	....
Standedge	England	3	1845.	....	....
Woodhead	England	3	1845.	$1,026,000	$65
Nerthe	France	3	1847.	2,000,000	133

The first named tunnel passes under a wide tidal estuary and dips downward toward the centre from the ends. This is always objectionable, and in this case was especially so, large land springs having necessitated an unprecedented amount of pumping. The Severn tunnel has been 11 years under construction, but will probably be completed a few months hence.

The following table gives some particulars of the longest American tunnels. We are indebted to Mr. H. S. Drinker's exhaustive work on tunneling for most of the figures, which serve by contrast to show the enormous magnitude of the four tunnels given in the first table:

TABLE NO. III.

PARTICULARS OF LONGEST AMERICAN RAILROAD TUNNELS.

Name of Tunnel.	Location.	Length. Feet.	Time in building. Months.	Cost.	Cost per running ft.	When completed.
Baltimore	Baltimore & Ohio	6,948	25	$1,060,000	$142	1873
Kingwood		4,100	30	724,000	176	1852
Sand Patch		4,725	96	575,000	80	1871
Bergen	N. Y., L. E. & W.	4,388	36	800,000	182	1861
"	Del., Lack. & W.	4,209	....	.....	.....	1877
Blue Ridge	Col. & Greenville.	5,865	....	.....	.....	1858
Blue Ridge	Chesapeake & Ohio	4,262	....	488,000	114	1857
Great Bend		6,449	....	.....	.....	1872
Galitzen	Pennsylvania	3,612	30	.....	.....	1854
King's Mount'n	Cincinnati So.	4,000	....	360,000	90	1876
Musconetcong	Lehigh Valley	4,879	27	.....	.....	1875
San Fernando	So. Pacific	6,966	....	1,450,000	308	1876

The Arlberg Tunnel is nearly five times as long as the longest of these American tunnels, though only one-third longer than the Hoosac Tunnel.

Some further correspondence appears in the *Engineer* as to the engines, "Rocket A. D. 1829" and "Rocket A. D. 1830," lately illustrated in these pages. The writers do not deny that Mr. Nasmyth's sketch represents one of the engines used in the opening of the Liverpool & Manchester Railroad, but generally agree that the "Rocket" had been then little altered, and in fact was identical in construction with the "Rocket" of the Rainhill trials in 1829. They also agree in thinking that the sketch of the "Rocket A. D. 1830" really represents, not the actual "Rocket," but one of the seven engines built between the trials at Rainhill and the opening of the line. If this assumption is correct, the titles "The Locomotive A. D. 1829," and "The Locomotive A. D. 1830," would more correctly describe our illustrations. It appears, at any rate, that the eleven months in question was an eventful period in the history of the locomotive, and that its development then made greater progress than is generally believed.

Of the thirteen additional railroads from which we have reports of September earnings this week, four have an increase this year, in two cases due to an increase of mileage. In the aggregate they have a decrease of less than two per cent. The one with largest earnings is the Richmond & Danville, and nearly all are roads with light earnings, and most of them Southern roads. Among the more important

the Cincinnati Southern shows a slight decrease in earnings, the Nashville & Chattanooga an increase of 6½ per cent, the Richmond & Danville a decrease of 7 per cent.

This brings up the number of railroads that have reported their September earnings to 67. Their aggregate mileage and earnings and average earnings per mile were:

	1884.	1883.	Inc. or Dec.	P. c.
Miles	41,069	39,014 +	2,055	5.3
Earnings	$20,257,167	$21,334,947 —	$1,077,780	5.0
Earn. per mile	493	547 —	54	10.0

Thus in spite of the increase of 2,055 miles in the length of road worked there has been a decrease of $1,077,780 in the earnings of these roads.

Reports have yet to come in from the important Eastern railroads, and what we have this week does not complete the list for any one district to enable us to judge of the general course, except from the South east of the Mississippi. We have had reports from 17 railroads there, whose aggregate mileage and earnings per mile are:

	1884.	1883.	Inc. or Dec.	P. c.
Miles	7,869	7,715 +	145	1.9
Earnings	$3,251,993	$3,586,141 —	$334,148	9.3
Earn. per mile	414	465 —	51	11.0

This is a very large decrease, but the Southern railroads continued to have an increase in earnings for some time after many Northern roads had been suffering a decrease. The same 17 roads in August had a decrease of $249,875—considerably less than in September. Reports have not been made yet by some important Southern roads, as the Norfolk & Western and the East Tennessee.

The summer packing season is nearing its close, and it shows a small increase (5 per cent.) over last year in the number of hogs packed, the number last year having been a little greater than the year before, but much less than in any other year since 1878.

Old corn is so scarce and high now and new corn is so plentiful that there was good reason after the crop was assured to put off fattening until the new corn was mature, so that probably the number marketed recently does not indicate the supply. It would be natural to expect that an exceptionally large number would be packed during the winter season (Nov. 1 to March 1) if the hogs existed. But there has been a considerable decrease in them since the last large corn crop. The estimate of the Department of Agriculture made them 28,680,000 in the packing states Jan. 1 last, against 32,456,000 June 1, 1880, by the Census—a decrease of about one-seventh, but nearly the same number as on Jan. 1, 1883. But the Department's report for Sept. 1 last year gave the number of hogs for fattening at that time as very much less than last year—about 6 per cent. less in the packing states; and if that is so it will probably not be possible to fatten as many hogs as last year, in spite of the abundance of corn, though there may be more pork, as the hogs will probably be well fattened, as the best means of disposing of corn. But, feeding as liberally as possible, there is likely to be an extraordinarily large stock of corn left in the farmers' hands next summer.

There has been recently a considerable decrease in the consumption of lumber in the Northwest, if the sales at Chicago may be considered as a test, as probably they may. We have shown heretofore that the consumption continued enormous during the first part of this year. Down to the end of June these were even greater than last year, though a little less than in 1882. In July the sales and shipments were less than last year; but on the first of August the aggregate for the seven months was as great as last year; but in August and September they were but 397,486,000 ft. this year, against 501,266,000 ft. last year—a decrease of 103,780,000 ft. or 26 per cent. This is a significant fact as indicating the ability and the disposition of people in the Northwest to undertake new construction.

Chicago through and local shipments eastward of flour, grain and provisions for the week ending Oct. 18, by the incomplete report to the Board of Trade, were 36,777 tons this year against 46,328 in the corresponding week of last year, and 23,060 in 1882. The shipments last week were the smallest for four weeks, and one-third less than the week before, which of itself is pretty good evidence that there was some restoration of rates, whether it was general or not. The tons shipped and the percentage of the total going by each road for the last six weeks have been:

	Week ending					
Tons:	Sept. 13.	Sept. 20.	Sept. 27.	Oct. 4.	Oct. 11.	Oct. 18.
Flour	2,785	3,823	5,396	7,186	9,403	7,612
Grain	17,154	22,916	26,514	33,592	36,235	22,370
Provisions	8,263	7,420	8,579	8,636	10,002	6,795
Total	28,202	34,159	40,516	49,414	55,640	36,777
Per cent.:						
C. & Grand T.	10.1	8.4	6.6	2.8	3.7	5.8
Mich. Cen.	8.3	8.7	17.0	19.6	15 3	17.9
Lake Shore	15.0	14.7	15.5	17.2	26 0	24.2
Nickel Plate	11.5	8.2	7.7	11.8	12.3	9.6
Ft. Wayne	19.3	20.8	17.3	15.6	12.8	18.6
C., St. L. & P.	16.6	14.5	16.6	16.9	11.5	11.0
Balt. & Ohio	7.7	9.1	8.0	9.4	7.9	5.8
Ch. & Atlantic	11.5	15.6	11.3	6.7	10.5	7.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

The shipments last week were not particularly large for the season, but they were large for a week following a great advance in rates. The shipments during this week for four successive years have been:

1881.	1882.	1883.	1884.
46,094	23,060	46,328	36,777

The shipments this year were thus less than in any other except 1882. Rates were about 12½ cents per 100 in 1881, so that the larger shipments then are accounted for. In 1882 the situation was much what it is now, that is, there had been a very large crop of small grains, which were coming forward rapidly, but the corn crop of the previous year had been the worst on record, and very little corn was moving. Rates were well maintained. Last year there was a very light winter wheat crop, but a large surplus from the previous year gave an abundance to ship, and there was more corn than the year before and more than now, but not what could be called a heavy grain movement. Rates were probably cut somewhat at this time last year, though perhaps less than in August and September.

The decrease in shipments last week compared with the week before was 19 per cent. in flour, 32 per cent. in provisions and 38 per cent. in grain—largest in the freight for which the lake vessels compete. The rail grain shipments were the smallest for five weeks.

The percentages by the different roads last week were similar to what they have been for a few weeks, the lines which had long been getting less than their share now getting more than their share. As the Chicago & Grand Trunk has settled the balance against it by the arbitrators' award, several of the roads are accumulating a large excess which they will have to pay over in cash at full rates to that company when the next settling day comes, unless traffic soon takes a different turn, even if the new arbitration does not give it a larger percentage than the old one. Last week the three Vanderbilt roads carried 51.7 per cent. of the total shipments, and the two Pennsylvania roads 29.6 per cent. Of the provisions, which in the summer the Chicago & Grand Trunk took most of, the Fort Wayne last week had 29.4 per cent., the Chicago, St. Louis & Pittsburgh 21.5 per cent., the Chicago & Grand Trunk 16.0 per cent., and the Lake Shore 14.2 per cent., leaving 18 9 per cent. to the other four roads. The Lake Shore and the Michigan Central carried nearly 60 per cent. of all the flour shipped; the two Pennsylvania roads 24½ per cent.; the Lake Shore carried the most grain—25¼ per cent. of the whole. It has been charged that rates were not entirely maintained last week, but if cutting was at all general, it shows that traffic without it would be very light. Lake rates have not advanced any, and a shipment of corn is reported at 1¼ cents a bushel to Buffalo—an unheard of rate at this season, so near the close of navigation, when there should be a pressure of traffic and advancing rates.

The Texas & St. Louis Railway, which does not usually report its earnings, has made a statement of them for September, when they amounted to $116,390, the road being 723 miles long, extending from the Mississippi opposite Cairo southwestward parallel with the Iron Mountain and the International & Great Northern to the heart of the Texas cotton country, with 12 miles of branches—all of 3 ft. gauge. This makes the earnings $158 per mile of railroad. During the year 1883 the road earned at about this rate, though it was open through only five months. The working expenses then considerably exceeded the gross earnings.

The second Sunday's experience in carrying passengers all day on the New York elevated railroads for a fare of 5 cents was more satisfactory than that of the first Sunday. The day was a perfect one, and the number of passengers carried was 26 per cent. more than on the preceding Sunday, and nearly twice as great as in the corresponding Sunday of last year, which was not a pleasant one, however. The number of passengers and the earnings in each of the two Sundays in both years were:

No of passengers:	1884.	1883.	Inc. or Dec.	P. c.
Oct. 12	216.605	151.777	+ 64,828	42.7
Oct 19	275,284	142.677	+ 132,607	93.0
Total	491,889	294,454	+ 197,435	67.0
Earnings:				
Oct. 12	$10,833	$11,833	— $1,000	8.4
Oct. 19	13,766	11,308	+ 2,458	21 8
Total	$24,599	$23,141	+ $1,458	6.3

The working expenses are estimated as $8,500 for last Sunday and $7,000 a year ago, and on this basis there was a *decrease* of $2,500 in the net earnings the first Sunday, and an increase in them of $958 last Sunday, compared with last year. The better weather this year counted for something, but probably the increase over the previous week was largely due to the wider knowledge that the fares would be low. The result for the two weeks makes it at least possible that the net earnings will be as large as before the reduction. But the gain in traffic is likely to be less in the winter than when the weather is fine, and a decidedly favorable result cannot be looked for as soon as if the experiment had been begun in the spring.

Canal rates have advanced within the last ten days from 4½ to 5½ cents a bushel for wheat from Buffalo to New York, which is a profitable rate, and ¾ cent more than was obtained at this time last year, when canal rates were lower than they had been from August down to the middle of October. Shipments made from Buffalo later than Nov. 10 are not likely to get through, so that the season is now winding up. By far the larger part of the Buffalo grain shipments have gone by canal, and probably substantially all the shipments to New York.

No advance is reported in lake rates, which remain at 1½ cents a bushel for corn and 1¾ for wheat from Chicago to Buffalo, against 3¼ and 3½ at this time last year. Probably few sailing vessels will take cargoes at these rates in November, when risks are great. There are great accumulations of wheat now in the Western markets, which will have to go forward, if at all before next May, by rail. There are also great accumulations of corn (in the farmers fields and cribs), and there is certain to be a heavy winter movement of that, because stocks in the East and the world over are nearly exhausted, and consumers cannot wait till spring. There is, therefore, reason to expect a large winter grain movement over the railroads from the Western markets to the seaboard.

Ocean rates are 3¾d. to 4d. per bushel for grain by steam from New York to Liverpool.

Exports of rails to this country from Great Britain have practically ceased, only *seven* tons having been shipped last September. The smallest shipments heretofore in any one month since June, 1879, at least, were 50 tons last May while the smallest in any month last year were 4,096, in February. The exports to this country in September and for the nine months ending with September for the last six years have been:

	1879	1880.	1881.	1882.	1883.	1884
Sept.	8,429	13,932	26,133	6,765	6,558	7
9 mos.	21,931	170,621	240,364	159,991	53,871	16,125

The *crescendo* from 1879 to 1881 has been followed by an equally decided *diminuendo*, and it will not be surprising if the *pianissimo* of September is followed by a long rest. For the nine months the exports were three times as great as this year in 1883, ten times as great in 1882, and 15 times as great in 1881.

Among other countries which have largely reduced their imports of rails from Great Britain are the following, to which the exports during the nine months ending with September have been for three years:

	1882.	1883.	1884.
Italy	51,787	46,457	8,683
Mexico	20,099	25,024	2,524
Canada	76,862	64,303	42,869
British S. Africa	24,411	22,369	8,591

The largest takings this year were by Australia, whither went 19 per cent. of the whole, followed by India, which took 16 per cent., and the Argentine Republic with 13½ per cent. This latter country took one-half of the small exports of iron rails, while India took one-fifth of them. The total exports to India decreased from 100,078 tons last year to 69,912 this year, which indicates that there is no considerable extension of railroads going on in this our latest rival in supplying Europe with wheat.

Record of New Railroad Construction.

Information of the laying of track on new railroads is given in the present number of the *Railroad Gazette* as follows:

Baltimore & Ohio.—On the new *Philadelphia Extension* track is laid from near Kiamensi, Del., to Red Clay Creek, 5 miles.

New York, Lake Erie & Western.—The *Erie & Wyoming Valley Branch* is completed from Hawley, Pa., westward to Pittston, 47 miles.

This is a total of 52 miles of new railroad, making 2,932 miles reported to date for the current year. The total track reported laid to the corresponding date for 13 years past is as follows:

	Miles.		Miles.
1884	2,932	1877	1,668
1883	4,947	1876	1,875
1882	8,314	1875	986
1881	5,639	1874	1,363
1880	4,388	1873	3,075
1879	2,739	1872	5,675
1878	1,635		

These statements include *main track only*, no account being taken of second tracks or other additional tracks or sidings.

At this season tracklaying is usually active, as the rails are going down on grading done earlier in the season. That so little new track is reported from week to week shows that not much more is to be expected this year.

NEW PUBLICATIONS.

The Bismarck Bridge; by Geo. S. Morison, Engineer and Superintendent.

Mr. Morison, in the form of a report to the Chief Engineer of the Northern Pacific Railroad, has followed up the most excellent example set by him in his report on the Plattsmouth Bridge, by putting on record in an orderly and scientific manner the story of the construction of the Bismarck Bridge over the Missouri River. The report is exceedingly full in the record of facts and experience, is well illustrated, well told, and beautifully gotten up. Its scope is covered by "Preliminary Narrative," "Peculiar Conditions of the Upper Missouri," "General Description," "Rectification Works," "Superstructure," "Approaches," "Cost," and in a series of appendices are given particulars of designs, tests, materials, and records The plates (26 in number) are exceedingly full, with much elaboration of detail, forming with the context a monograph of great value, and exhibiting much literary skill and judgment. While all portions of the report possess great interest, that relating to "steel" is of peculiar value at this time, when so many engineers are groping after the facts that will guide them to an intelligent use of that apparently evasive material. Mr. Morison's experience in this direction has evidently been attended with satisfactory results, since after the construction of the Plattsmouth Bridge he has not hesitated to use the same material for the Bismarck Bridge. In the case of the Bismarck Bridge the steel was intended to be from the Bessemer process, but being unfortunate in the selection of the concern to make it, delays in manufacture and unreliability of products forced the adoption of the open-hearth steel, at that time the only attainable steel for rapid delivery. The use of steel was confined to the 400 ft. spans, and in compression members was very wisely confined to top chord and end posts, and in tension members to the ten central panels of the lower chord, and of course for all pins. Iron was used for all diagonals of web, since the experience at Plattsmouth had shown a difficulty in securing eye-bars that would show a uniform ultimate strength, or "develop anything like a uniform elongation before fracture," this criticism not being of such importance in centre bars of lower chord, where maxi-

mum strains are seldom if ever reached, and where they are slowly developed. It would seem that the same reasons should have governed the consideration of the main diagonals near ends of span, since after all the elastic limit is the working basis for proportioning material and not the ultimate strength.

The steel specifications were modified after the commencement of the work to read as follows: Elastic limit (eye-bars and pins) within a range between 40,000 and 50,000 lbs., and for compression members elastic limit to range between 50,000 and 60,000 lbs., with ultimate strength not less than 80,000 lbs., the test-bars elongating 14 per cent. before breaking, with a reduction of area of 30 per cent. at point of fracture; elastic modulus not exceeding 30,000,000 lbs. or falling below 28,000,000 lbs. Steel in compression members, bolsters, bearing plates, pins and rollers, was required to have not more than 40 nor less than 34 carbon, and not to exceed $\frac{1}{10}$ one per cent. phosphorus. For rivets and eye-bars the limit allowed for carbon was from 16 to 30, a round sample bar to be capable of being bent cold 180 degrees and straightened thereafter without showing crack or flaw.

The record of all steel tests given is confined to open hearth, since "the record of Bessemer tests was valuable simply as showing how irregular a product can be made," and therefore not given. The eye-bars were all made by the Kloman process of rolling. Despite the low carbon in the tension steel, it was found that annealing had a decided effect on the ductility of the metal, and all the heavy bars were required to be annealed. It is not to be inferred from the record of Bismarck Bridge that Bessemer steel is unsuitable to bridge construction. The trouble grew out of the ignorance and incapacity of the parties undertaking to make it, and the then condition of the long established Bessemer works rendered it impossible to get billets elsewhere. The maximum strains permitted under the assumed loading was 15,000 lbs. on top chords, and 14,000 lbs. on tension members, which was slightly increased, owing to the resultant dead weight after construction. In commenting upon the use of steel in this bridge, it would seem there was still some timidity in its application, it having been less freely used than at Plattsmouth. It will be noticed, however, that Mr. Morison has adopted unit strains on his steel, bearing about the same ratio to its minimum permissible elastic limit, very nearly, as in iron.

The whole cost of the Bismarck Bridge was nearly $1,100,000, of which about one-fifth was chargeable against freight. As previously remarked, this report is extraordinarily complete, particularly in its records, and will always form a mine of data on the subject on which it treats. It is reports of this character that stand out in splendid relief in this age of book-making, forming as they do the most valuable part of an engineer's library, and Mr. Morison deserves the thanks of the profession for his painstaking labor and for furnishing an example to his professional brethren to go and do likewise. There is infinite satisfaction in the contemplation of work that one has accomplished, but it is an added glory to feel that one has added to the world's stock of knowledge, and made it accessible for future laborers.—A. P. B.

How Mr. Joy came to be in the Wabash Board.

At the meeting of the Wabash general mortgage bondholders in London, Oct. 10, Mr. James F. Joy, the President of the company, explained his connection with it as follows:

"It became evident, also, that it was important that he should accept the presidency and come here. He did it with the utmost possible reluctance, as he thought he had got through his railway life, and he never meant to be interested in any railway where the responsibility would come on his shoulders. He had carefully avoided from the beginning having anything to do with the Wabash road, but three or four years ago he was solicited to allow his name to be used as a director. He declined flatly, but after a time the Wabash people found it necessary, as they thought, to build a road to Detroit, so as to connect Detroit with the Great Western Railway of Canada, and the Grand Trunk also, so that they might have an outlet and inlet for their property in the east, independent of Toledo. The Lake Shore road went along the south shore of Lake Erie, and ran then 250 miles further west to Chicago. On the north side the Michigan Central ran west to Chicago and east to Buffalo. Both of these roads were interested in carrying business west through to Chicago. The result was that the Wabash at Toledo could get no business from east to west from railways. They found it very important, as they thought, to acquire a road to Chicago which would give them that communication. He was a citizen of Detroit. They stated to him what their object was, and asked him if he would not consent to aid them in their object. With the feeling they had at Detroit, that the Wabash would be of great importance to that city as well as a communication to the Wabash itself, and in the distinct understanding that he could not look into their finances, or take any share in the general management of the road, or give any time to anything except to aid them in accomplishing the object at Detroit, he allowed them to use his name, and he had helped them to accomplish that purpose. He regretted now, personally, so far as he was concerned, that he ever, in any form, became connected with it. It had led him a great deal further than he meant to go, and had brought him there at the head of the Wabash road, to consult with the bondholders, and see if by any possible means whatever the Wabash road could be rescued from its perilous position."

As to the different courses which the bondholders may pursue, Mr. Joy said:

"There were three alternatives: Receiver, hostile foreclosure, amicable arrangement. He supposed that this meeting would appoint a committee before whom all these questions could be discussed, and then report to the bondholders for their approbation or disapprobation. If they choose hostile foreclosure, then his mission was ended. He should not be one to oppose hostile foreclosure. He should retire from the head of the Wabash road. He would not allow himself to be put in the position of opposing bondholders, though he thought perhaps rigid foreclosure, if they could get it to-morrow, would be the greatest injustice that could be done to the large amount of interest represented by stock, and which ought to be fairly considered."

The Western Railway Club.

The Western Railway Club held its regular monthly meeting at Chicago, Oct. 15, Mr. B. K. Verbryck, President, in the Chair.

The following circular has been mailed to all the master mechanics, master car-builders and railroad supply men within reasonable distance:

"At the request of the Western Railway Club, would call your attention to the advantages of such a club in Chicago.

"It is intended to make it an organization similar to the Car-Builders' clubs of New York, Buffalo and Boston, excepting that the membership includes master mechanics and others in charge of work in the construction departments of railroads.

"The object of the Association is the advancement of knowledge concerning the construction, repair and service of railroad rolling stock by discussion in common; investigations and reports of the experience of its members; to provide an organization through which the members may help to bring about uniformity and interchangeability in the parts of railroad cars; to improve their construction, and to adjust the mutual interests growing out of their interchange and repair.

"The Committee on Membership would like to have your name as member, and invite you to inspect the rooms and attend its next meeting, at No. 103 Adams street, Chicago, the third Wednesday of this month. Annual dues, $5."

The Treasurer's report was then read and showed a balance on hand of $99.35.

On motion of Mr. MACKENZIE (New York, Chicago & St. Louis), seconded by Mr. TOWNSEND (Chicago & Alton), an amendment to admit dealers in railroad supplies as honorary members was carried unanimously.

Article VI. of the Constitution at present reads as follows: "At each meeting the President shall appoint a committee of three, whose duty it shall be to report at the next meeting a subject for discussion and investigation, also a committee to investigate and report on the subjects presented by the previous committee. These subjects shall be taken up at the proper time, and shall form the principal business of the meetings."

On the motion of Mr. BRYAN this article was amended by striking out all that relates to an investigating committee, and providing that the committee to select subjects notify the members two weeks before each meeting of the subject to be discussed.

Mr. MACKENZIE moved that the President and Secretary be a committee of two to prepare a regular order of business to govern the Club, and report at the next meeting. Carried.

Mr. MACKENZIE: Members should present subjects for discussion at one meeting for discussion at the next meeting, so that the matter might be printed, and each member would be prepared to enter on the subject when he came here.

The PRESIDENT: I would prefer to have the subjects chosen for discussion printed for the next meeting.

Mr. MACKENZIE gave notice of an amendment, providing that all members may present at each regular meeting subjects for discussion at the next meeting, and that the President shall decide which of such subjects shall be presented for discussion at the next meeting.

The meeting then took up the regular subject for discussion,

LOCOMOTIVE TIRES.

The Secretary read a communication from Mr. G. W. Stevens, stating that 247 worn-out tires were removed by the Lake Shore & Michigan Southern during the year 1883. Average miles run per $\frac{1}{16}$ in. wear, 8,977; the measurement of wear being taken at $\frac{1}{2}$ diameter of tire.

In many cases class of steel was not known.

Mr. MACKENZIE: We have two different kinds of tires, and I undertake to show the difference in wear of the tire between the first and second turnings or between the second and third. Engine 202, Class A (switching), has had her tires turned twice. Original thickness of tire, 3 in.; thickness after first turning, 2 $\frac{17}{32}$ in.; number of miles run before first turning, 31,647; miles run per $\frac{1}{16}$ in. wear, 4,220; second turning, from 2 $\frac{17}{32}$ to 2 in.; miles made between turnings, 33,580; miles per $\frac{1}{16}$ in. wear, 3,950; total mileage up to last turning, 65,227 miles. The mileage between the two turnings was nearly the same. In another case, an engine in freight service, the mileage per $\frac{1}{16}$ in. wear before the first turning, was 4,440, the mileage before the first turning being 34,303 miles; the mileage per $\frac{1}{16}$ in. wear between the first and second turnings was 6,860; the total mileage was 78,708 miles. All our freight engines make a greater mileage after the first turning than they do before, while with the switch engines it is the reverse. Both of these turnings were made after about the same time—about a year between the turnings. The tires generally were round, without flat spots.

Mr. PRESCOTT (Texas & St. Louis): How did you obtain the mileage of your switch engines?

Mr. MACKENZIE: We allow six miles an hour. The traffic was about the same at all times of the day.

Mr. PRESCOTT: Sometimes engines lie around and do nothing, and in other seasons they work 24 hours a day, and it is the same way with engines on local freight trains switching; at some seasons of the year, where the freight is very heavy, they are worked a great deal more than at others. Your mileage may be very low on the local freight. On our Northern road they are now taking in wheat at every station, while at some seasons of the year they have very little to do.

Mr. MACKENZIE: Of course you cannot get the exact mileage; it is difficult to get the mileage even of a through freight.

Mr. PRESCOTT: We can never arrive at exact knowledge until we put a device on engines to register the mileage actually made with a tire.

Mr. ALLEN COOK (Chicago & Eastern Illinois): What is the experience of members who use tires thicker than 3 in? Is it profitable? How did the metal act after 1½ in. or 2 in. of the metal was worn off? Were the wearing properties as good?

Mr. MACKENZIE: A 3-in. tire is better than any other thickness.

Mr. COOK: If we were sure of getting a good solid metal 3 or 4 in. thick, it would save putting on tires so often. Has any one worn out one of these thick tires, and were good results got from the centre of it?

Mr. MACKENZIE: A record of turnings will show which is the best. I prefer cast to wrought-iron shoes on driver brakes.

Mr. W. H. LEWIS (Delaware, Lackawanna & Western): Recently I removed a 42-in. coach tire worn $\frac{3}{16}$ in. from the wrought iron combination shoe. The tire was not worn where it bore on the rail.

Mr. MACKENZIE: In connection with the wrought-iron shoe, have any members found any difference in the size of their drivers? In one we found ⅛ in. difference between the back pair of wheels and the middle pair. What was the cause?

Mr. COOK: Has any one taken out steel-tired wheels from under coaches for any thing but sharp flanges?

Mr. PULLMAN: I do not remember ever taking out a pair of wheels that were worn straight down on the rail.

Mr. COOK: That has been my experience. I do not have to take them out to turn them because they are worn, both wheels alike, but because they have run on one side and have got a sharp flange, or are going to get a sharp flange.

Mr. TOWNSEND: I have had to take steel-tired wheels out when the flange was good because they were worn hollow in the centre.

Mr. PRESCOTT: All of ours require turning because of a sharp flange on one side.

Mr. COOK: How much can you turn off from the flange?

Mr. REYNOLDS: Our limit is 1 in.

Mr. COOK: We turned off a set from under a Mogul engine; the wheels all looked well, but one day 9 in. of flange came out, and we found it was all honeycombed. We had turned down almost to it. We turn our cars, and our curves are about evenly divided.

Mr. PRESCOTT: If locomotive tires will run true, a car wheel should do the same if properly turned up both of a size and the truck is square. A car wheel should run just as well as a locomotive tire.

Mr. COOK: Cars have not so much to steer them as a locomotive: a locomotive is accurately made and watched closely, while coaches are switched and slid along, and run in dust and grit, which tends to cut the flanges and wear the wheels more than on a locomotive.

Mr. PULLMAN: I never found two steel-tired wheels worn alike, or of the same size when they were taken out. I do not know any way to find out why a wheel is wearing partly on one side and partly on the other.

Mr. TOWNSEND: Why is it that some tires have a soft place in them, or hard spots, while between it is perfectly soft and becomes flat, so that the wheel does not wear round, and it is almost impossible to turn it? Some wheels will take two days to turn, while an ordinary pair of wheels can be turned in four or five hours. Such wheels do not give as much wear as those that are not so hard. How do Washburne wheels wear, and what satisfaction do they give?

Mr. COOK: Washburne wheels are doing very well under tenders and under the front of Mogul engines. They did not do so well where the flange is cut in the fillet and the wheel has had a considerable amount turned off. We then get into honeycombs; but when we first start and after one turning we got good results. They made good mileage, wore round, uniform, and did what we call good service.

Mr. TOWNSEND: We have about 500 of them, but have never had one honeycomb yet. They have given excellent mileage, and their flanges have worn better than the ordinary steel-tired wheel.

Mr. COOK: None have worn so on cars, but we do find them on locomotives.

Mr. TOWNSEND: Most of ours have been taken out for a sharp flange, showing that one tire has been softer and wore away faster that the other or they may not have been both the same size.

Mr. COOK: They are accurate when turned out.

The discussion was then closed and the meeting adjourned.

TECHNICAL.

Locomotive Building.

The Baldwin Locomotive Works in Philadelphia have completed an order for heavy freight engines for the Missouri Pacific road and have just received an additional order from the Wabash, St. Louis & Pacific. They are also building a locomotive with 16 by 24 in. cylinders and 5 ft. driving wheels for Morgan's Louisiana & Texas road, which is to be exhibited at the New Orleans Exposition before going on the road.

The South Tredegar Iron Co. in Chattanooga, Tenn., recently completed a small shifting locomotive for use in its yard. The work was all done in its own shops.

The New York Locomotive Works in Rome, N. Y., have received a contract to build 11 consolidation freight engines for the Wabash, St. Louis & Pacific road.

The Hinkley Locomotive Co., in Boston, last week shipped a locomotive of 2 ft. gauge to the new Franklin & Megantic road in Maine.

Car Notes.

The Wason Car & Foundry Co., in Chattanooga, Tenn., is at work on a large order for coal cars. The foundry is turning out a large quantity of car and locomotive castings for the Cincinnati, New Orleans & Texas Pacific road.

A report that the Pullman Car Works in Detroit were to be closed is contradicted. Work is rather slack just now, as in most of the car shops, but there is no intention of shutting down.

Iron Notes.

The Lackawanna Iron & Coal Co. has closed a contract with the Canadian Pacific Railroad for 10,000 tons of steel rails, delivered at Canadian ports at $28.50 per ton. This is believed to be the first contract for steel rails made in the United States and delivered in Canada. The bid of the American company was under that of any English concern.

Francis & Co. have completed and put in operation a forge at Spring City, Chester Co., Pa. They will make blooms from scrap iron.

The property of the Union Iron Co. at Portsmouth, O., will be offered for sale Nov. 11. The real estate consists of Jackson Furnace, Washington Furnace and Munroe Furnace, with the adjoining iron and lumber properties, the three tracts including 18,800 acres of land.

The Ellis & Lessig Steel & Iron Co. has been organized in Pottstown, Pa., and will put up works for the purpose of manufacturing steel rails.

Manufacturing and Business Notes.

Otis Brothers & Co., of New York, have recently taken orders for hoisting engines from the Glamorgan Iron Co. and from the Youghiogheny Coal Co., of Pittsburgh.

Mr. Carson Woods is now in Australia for the purpose of introducing on the railroads of that country the Leve & Alden palace cars, Scott's patent sleeping car, the Harrison postal car, the Burton stock car and the screw-lever dump car. He recently obtained an order for two Harrison postal cars for the New South Wales government railroads.

The Rail Market.

Steel Rails.—The market is steady with a fair demand from good buyers. Quotations continue $28@$28.50 per ton at mill, although it is reported that a large cash order has been placed at $27.50. No farther advance is looked for at present.

Rail Fastenings.—The market is very dull, but with little change in prices. Quotations are $2 per 100 lbs. for spikes in Pittsburgh; $2.35@$2.50 for track-bolts, and 1.60@1.75 cents per pound for splice-bars.

Old Rails.—The market for old iron rails is dull. Quotations are about $18@$18.50 per ton at tidewater, but buyers are not disposed to pay these prices. Old steel rails are quoted at $17@$18 per ton in Pittsburgh for mixed lots.

British Rail Exports.

Exports of rails from Great Britain during the month of September and the nine months then ending to the United

States and to all countries are reported as follows by the Board of Trade, in tons of 2,240 lbs:

To United States:	September. 1882.	1883.	1884.	Nine months. 1882.	1883.	1884.
Iron rails.....	103	50	7	20,916	2,569	7
Steel rails ...	6,662	6,508	.....	139,075	51,302	16,118
Total.....	6,756	6,558	7	159,991	53,871	16,125
To all countries:						
Iron rails.....	2,621	1,100	1,424	40,580	21,202	11,571
Steel rails....	47,538	63,242	34,232	552,555	579,421	420,382
Total. ...	50,159	64,342	35,656	593,135	600,623	431,953

The exports to the United States in September were the smallest of which we have any record, but there were, we believe, some months, before 1879, in which there were none. Strangely, the seven tons of these exports were iron rails, and the first reported this year. The exports to countries other than the United States in September were 35,649 tons this year, against 57,784 last year, and 43,394 in 1882. The decrease from last year is nearly 40 per cent.; but for the nine months ending with September the decrease was only 28 per cent.—from 432,144 in 1882 and 546,752 in 1883, to 415,828 this year—not much of a decrease from 1882.

Crossing Trains at Stations.

The Massachusetts Railroad Commissioners have made the following report on a recent accident: "The death of Benjamin A. Brown, Oct. 4, at the Bird street station on the New York & New England Railroad, resulted from his leaving a local train on the wrong side, and before the train had stopped, while an east-bound express train was passing, by which he was struck. The rules forbid 'crossing' a train at a station, and secure the right of approach to the train first entering 'the station block,' while the other train is directed to come to a full stop. The engineer of the express train was misled as to the position of the local train, and believed it to be east of the station and out of the block. But the difficulty of estimating the nearness of a train by its headlight when it is directly in front always exists, especially on a dark night like that of Oct. 4. This place is peculiarly dangerous because of the bad curve, which is only 2,000 ft. west of the station, and, although these two trains have never met precisely at the station before, such a meeting is always liable to occur. Where stations are only half a mile apart, the unavoidable variations in the time of a through train make it impossible to avoid such 'crossings.' It was in evidence that passengers persist in taking and leaving trains at this and neighboring stations on the wrong side, regardless of the peril and of the frequent efforts of trainmen to prevent this dangerous practice, such efforts being regarded as insults and as invasions of the rights of the people. The Legislature has declined to forbid the passing of trains, receiving or discharging passengers by trains running at speed or to act upon the subject. It is, especially at points like this station, the duty of railroad managers to guard passengers against the fatal results of their own carelessness, and even willful recklessness. This can be done to some extent by using platform gates, and most effectively by separating the tracks by a fence. It is recommended that the cars of the local trains on this road be provided with such gates, or that fences be erected between the tracks, and, at this and other stations, which are peculiarly dangerous by their positions and by the practice of taking and leaving trains on the wrong side, a fence is desirable. The managers of other roads are advised to consider the expediency of adopting like precautions."

Corrugated Iron Roofs.

The new buildings for the fair and exhibition of the Pennsylvania State Agricultural Society, which are very extensive, including a main building 300 by 150 ft., with machinery sheds, cattle sheds, stables, restaurant, buildings for exhibition of flowers, etc., have roofs of corrugated iron, manufactured by the Cincinnati Corrugating Co., of Cincinnati, O. In all 210,000 feet of iron were used, and this roofing has given satisfaction and attracted much attention from visitors.

The Cable Railroads in Philadelphia.

The two large Corliss engines which are to run the underground cables on the Market Street passenger railway, in Philadelphia, from the ferries to Forty-second street, were successfully tested last week. The engines are 300 horse-power each, and were built by Robert Wetherill & Co., of Chester, Pa. The new engine and machinery house is situated at Twentieth and Market streets. The six boilers of 75 horse-power each, which supply steam to the engines, were also built by Wetherill & Co. In about six weeks the cable on the east division of the Market street line from Twentieth street to the river, will be put down, the greater portion of the tunnel being now completed. There will be two sections of cable on Market street, both run by the engines at Twentieth street. The west section will run from Twentieth street to Forty-second street. Each of these cables will weigh 19,000 lbs. The first named will run at the rate of 7 miles an hour, and that to West Philadelphia at 10. Similar engines and machinery to those just completed at the Twentieth and Market streets station will at once be put in at the engine-house at Twenty-third street and Columbia avenue, to run the cable on the Columbia avenue line. Similar engines will also be placed in the new building on Sansom street, below Ninth, which will be erected by the Traction Co., which will run the cable on the Sansom street line.

The Locomotive Trade in England.

The locomotive building trade is very brisk in England and Scotland just now. Some new works are being erected at Glasgow, the centre of this industry, adjoining the existing locomotive works trading as Neilson & Co., and owned and managed by Mr. James Reid. The new works are owned by the Clyde Locomotive Co., in which Mr. James Pearce, the builder of the "Oregon," "Alaska," "Arizona," and other fast Atlantic steamers, is the principal stockholder. The competition between the three firms in Glasgow—Neilson, Dubs and the Clyde Co.—will doubtless be exceedingly keen. A large number of locomotives are, however, required to cope with the rapidly increasing wheat traffic on the East Indian railroads, and with a steady home demand, and continual small orders from remote colonial and foreign lines, will doubtless keep all the works fully employed. The excellent harvest in England, and the consequent cheapness of food, is also likely to have a favorable effect on the passenger traffic for several months hence, and so strengthen the home demand for locomotives.

Fast Time on the Water.

The new Cunard steamer "Umbria" attained a maximum speed of 24 miles an hour in her trial trip on the Clyde. This, however was in smooth water, and it is not probable that it will be equaled at sea, although the builders expect that she will beat the fastest run yet made on the Atlantic—that of 472 miles in 24 hours, an average of 19¾ miles per hour, by the "Oregon."

The fastest time on record on the water, we believe, still remains the run of 100 miles in 4 hours made by the "Mary Powell," on the Hudson River, which also was in smooth water. The new steamboat "City of Kingston," on the Hudson last summer ran a short distance at the rate of 25 miles an hour, but has not yet equaled the record of the "Mary Powell" on a long run. The "Albany" on the Hudson River has also made the same time for a short distance, but not on a long run, and the "Mary Powell" remains the champion of the river.

Very fast time was made on New York bay some 20 years ago by the "William Cook," a boat which at one time belonged to the Camden & Amboy Railroad Co.; its present whereabouts we do not know. The "Thomas P. Way," a small boat, was said to have made 24 miles an hour, also on New York bay; this boat is still running, but her speed was reduced by alterations afterward made, although she is still a fast boat.

Some of these statements are made from memory, and our readers may be able to correct them, or to supply other instances of fast time on the water.

The Keely Gun.

The *Scientific American* illustrates, describes, and very thoroughly exposes this wonderful scheme. The "etheric" force summoned into action by wizard-like taps of a hammer is nothing but compressed air, and that marvelous product of ingenuity, the Keely gun, is nothing but an exceedingly clumsy and unpractical air-gun.

Electric Train Signal.

The Cincinnati, Indianapolis, St. Louis & Chicago Co. is testing a system of electric train signals, invented by Mr. J. D. Fee, of Chicago. This system is intended to supersede the bell-cord as a means of communication with the engineer in his cab, and by an additional contrivance every signal given is repeated back automatically to the baggage car and there registered, furnishing a record which may be useful in case of accident. The test will be continued for some time.

The Use of Steel Scrap in Forgings.

There appears to be no end to the evidence that there are men who have never heard of an open-hearth steel-melting furnace, or of the possibility of doing anything with steel scrap except to pretend to weld it into bars under a hammer. No doubt there must be many railroad men who are always anxious to use such waste or scrap material in their own shops, and it appears to be to them a natural supposition that a class or kind of stock that can be worked or drawn out under a hammer, from the merchant-bar form into any special required shape, can be or must have been originally made in the same way. It continues to be a source of surprise to many foremen that a metal to be steel, even though it has been made by melting, should so stubbornly refuse to become a solid or homogeneous part of some forging or welded bar into which, as a scrap material, it has been put. It would seem certain that the discussion of a few years ago, in the Institute of Mining Engineers, of the difference between "ingot iron" and "weld iron," lengthy though it was, and tiresome as it became to many, has either been too completely forgotten, or that a new generation of leading men has largely succeeded to the control of forges and some other shops who have not heard or read of the details of this discussion. If this discussion showed anything it indicated that the absolute nature of these metals is such that it is not worth while to try to make them affiliate with each other, as in a scrap forging, so sure is the attempt to end in disappointment and defeat.

It is true, no doubt, that steel scrap accumulates in railroad yards, for which either no price at all can be secured, or a price which appears wholly trifling to those in control, and from this there very naturally springs the desire, which too often proves irresistible, to utilize their furnaces, hammers and other fixtures which stand so complete and ready for use, and which appears to be exactly the means needed to put into an available form this material which no one can be prevailed upon to buy and take away. It is probable that a good deal of money would be saved if a law could be enacted prohibiting the use of steel scrap, taking the word "steel" in its widest meaning, for any other purpose than the supply of a melting furnace. At all events, it ought to be understood that any such scrap material, which steel-melters do not want, cannot be transformed into a condition worthy of a second thought by any means or process which is in the slightest degree inferior in the intensity of the heat applied or in power of assimilation to the best modern steel-melting furnaces.—*Iron Age.*

Steel Nails.

There seem to be two erroneous impressions abroad regarding steel nails. One is that they are much harder to cut than iron nails, and the second that they are not being introduced very rapidly, the trade being very slow to take hold of them. The reverse is true. The nailers at the Riverside Iron Works, Wheeling, recently cut in one week 7,564 kegs of steel nails. This is the largest output ever made by any factory in the world working 55 hours per week and making standard weights of nails. On the other hand, the demand has more than kept pace with the product. It is asserted that few articles have ever been introduced to the hardware trade that have won favor so quickly as steel nails. It is asserted that since the Wheeling mills began the manufacture of steel nails there has been no time that they were not behind their orders. That the steel nail is a success is evidenced by the fact that one of the Wheeling mills, which has been delaying completing its projected Bessemer plant until the result of the experiments at the other mills was known, is now pushing it to completion, while other mills are purchasing steel blooms for making nails.—*Iron Age.*

Sailing Ships vs. Steamers.

There is a tendency at present, observes an English paper, to supplement the mercantile marine with many new sailing ships. It was thought that the class would, with the introduction of steam tonnage, have become speedily extinct, and the gradual diminution of wooden vessels for some time favored this conjecture. A change has, however, of late been seen, and it is a change that is not without interest to the coal trade. At some of the English ports several large new vessels of wood have been recently built, and at present on the Tyne and on the Clyde many superior iron sailing ships are in course of construction. The reintroduction of sailers to a much larger extent than was some time ago anticipated is no doubt due to the spirit of economy which has perforce during the past two years manifested itself in the shipping business. The reduction of freights, the increase of dues and a diminished carrying trade have led many shipowners to economize, and it is held by some that, under favorable circumstances, the ships that use no fuel will be able to make quick voyages and leave favorable profits. At any rate, the experiment is to be made in many directions.

Casting Steel Tires.

At the open-hearth steel works of the Cambria Iron Co. the experiment is now being made of casting steel tires for locomotive and car-wheels by running the metal directly from the furnaces into cast-iron molds, and ready, when cooled, to be fitted and shrunk on. This process, if successful, will dispense with the ordinary process of casting in sand molds, and will not only greatly facilitate operations, but also lessen the expense.—*Johnstown (Pa.) Tribune.*

THE SCRAP HEAP.

Take Both.

Skobeleff, the famous Russian general, was working one evening in his tent near the Danube, when a Turkish bomb dropped at the threshhold of the tent. The general had just time to see the sentinel outside stoop down and phlegmatically throw the shell into the water. Skobeleff approached the soldier and said, "Do you know that you have saved my life?" "I have done my best, General." "Very well; which would you rather have, the St. George's cross or 100 roubles?" The sentinel was a Jew with a fine Semitic profile. He hesitated a moment, and then said: "What is the value of the St. George's cross, my general?" "What do you mean? The cross itself is of no value; it may be worth five roubles perhaps, but it is an honor to possess it." "Well, my general," calmly said the soldier, "if it is like that, give me 95 roubles and the Cross of St. George!" Whether the prayer of that child of Israel was granted or not history does not say. Railroad men have generally to go without either, as they never have the same chances as the sailor, who was asked which he would prefer, a nip of brandy, a glass of rum and water, or some hot punch. Jack replied that he would take the nip *now*, and then he would drink the rum while the punch was being made. He also possessed courage and presence of mind.

Oil Region Nomenclature.

The Macksburg dialect is a source of amusement to the Pennsylvania producer. The Buckeye granger has been dabbling a little in the business of oil producing for 25 years, and has developed a nomenclature peculiarly his own. He steps in a hardware store and tells the dealer: "I want a three way piece and a dip. I got a rope jacket last week, and if I could get an augerman I would rid out one of my wells next week. I was doin' right smart when it stopped." This might puzzle a Pennsylvanian for a second or two, but the Macksburg dealer in oil-well supplies knows perfectly well that his customer wants a tee and a bailer, and that he already has a rope socket, and that if he could find a driller he would have one of his wells cleaned out.—*Petroleum Age.*

Colored Firemen.

Considerable trouble has been caused on the Texas & Pacific Railroad recently by the employment of some colored men as firemen. The white firemen protested, but the only answer received was the discharge of several of them and their replacement by colored men. This has led to some violence, one or two trains having been stopped on the New Orleans Division by masked men, and the firemen obliged to get off and leave. Quite a number of men have been discharged from the road recently, both train hands and shop hands, and a very ugly feeling is reported among them, especially on the part of those who have been replaced by negroes.

Definitions.

Some genius has been calculating values as related to human energy in various departments of life, and cites the following illustrations: "The British Poet Laureate can take a worthless sheet of paper, and by writing a poem on it can make it worth $65,000; that's genius. Vanderbilt can write a few words on a sheet of paper and make it worth $5,000,000; that's capital. The United States can take an ounce and a quarter of gold and stamp on it an 'eagle bird,' and make it worth $20; that's money. The mechanic can take the material worth $5 and make it into a watch worth $100; that's skill. The merchant can take an article worth 25 cents and sell it for $1; that's business."

The list might be extended. A railroad president can sell you a bond warranted to pay 6 per cent., and then assess you $7; that's financial ability. A board of directors can bond a road for $100,000 a mile, and then discover the traffic don't amount to a red cent.; that's railroad enterprise. A man can get a railroad station for nothing, and then turn it into a dry goods store; that's Jay Gould. A man can pay ten cents for a seat in a car, have to stand all the time on a platform, and then fall off and be cut to bits, and called a drunkard; that's the Elevated. A man can run two cars together, and then find four fingers missing; that's car-coupling.

A Lucky Number.

"There are things in this world so odd as to appear like miracles," remarked the conductor of a railway train in Ohio. "During my service on the road I've seen some coincidences and things of that kind really wonderful. For instance, one day I had to walk from one station to another on our road. A train was due along there pretty soon, going the other way. Turning this fact over in my mind in a peculiar way, as a man will sometimes, I remarked to myself, as I looked at my watch, that I believed I could walk the distance of 22 telegraph poles before I would have to step off to let the train pass. I walked on, counting the poles. I had passed eighteen when I saw the train coming. Quickening my pace, I just made the 22d pole when I was compelled to step aside. As I did so I noticed that the locomotive was number 22. Then I reflected that the train was number 22 also. Reflecting on this, the fact came into my mind that that was the 22d day of the month, and that I was 22 years old at the time. As I started on I looked one side at a mile-post by the side of the track. On it was painted the figure 22. It was that many miles to the end of the line. At the hotel in town that night I was assigned room 22. Naturally I was much impressed by this remarkable series of coincidences. I talked of it to my friends. One of them, a young sport, told me that was my lucky number and advised me to gamble on it. I had never visited a gambling house, but he took me to one. Stopping at a roulette wheel I played my money on the square numbered 22."

"Did you win?"

"No; I lost $22 in 22 minutes by the watch."—*Chicago Herald.*

Train Wreckers Wanted.

The Atchison, Topeka & Santa Fe Co. offers a reward of $5,000 for the apprehension of the parties who placed obstructions on its road one mile east of Emporia Junction, Kan., on Oct. 5, wrecking a special freight train and killing J. G. Scott, the fireman. The detectives of the company have tracked suspected parties to St. Louis. The obstructions were undoubtedly placed on the track to wreck an express train and secure plunder, but the robbers were baffled by a special freight.

Economy in the Use of Supplies.

General Manager Broughton, of the Chicago & Atlantic roads, recently issued the following circular to agents and employés of the road:

"On and after Aug. 1 the new storehouse at Huntington will be open, and all requisitions for stores will in future be sent to the Storekeeper, who will supply the demands so far as may be prudent and convenient, with due regard to economy.

"I earnestly hope, however, that in the present depressed state of business and rates, every agent, and every head of

department will consider well before making demands for stores that may in many cases be saved.

"I do not desire that any of the company's property shall be allowed to depreciate for want of the necessary repairs; but before you send in a demand note you will think, 'Can I get along without this article?' If in addition to this care the agents will personally see that there is no waste of oil, wicks or other stores of that class at their stations, a saving may be made in the consumption of them.

"A great source of expenditure is the breakage of lamp chimneys and lantern globes through bad trimming and careless handling. I have directed the Superintendent to watch these cases, and where there is manifest negligence to charge the careless person with the damage. I may say that, in my opinion, one of the claims of a man to promotion is his ability to point to his care in the use of stores committed to his charge.

"I have also noticed the want of system in dealing with links and pins. In every yard of any size there should be one or more boxes into which yardmen should drop links or pins instead of throwing them on the ground where they are liable to be buried in the ballast, or picked up by the numerous people who get a living by gathering what is called old iron.

"As the coal and wood season will soon be here again, I may remind the employés that it is for their own comfort, and the comfort of the passengers, that coal should be put into the stoves of the offices and waiting rooms, rather than be allowed to be wasted on the ground. Coal boxes are provided, and the use of coal by improper persons should be jealously prevented. While it is desirable that the offices and waiting rooms should be kept comfortable, there is no necessity to waste fuel.

"In short, let all those in the company's service use its property as they would their own, and the result would be satisfactory. We can have economy without parsimony, and frugality without stinginess. It is prodigality and waste against which we have to fight; and, if we were inclined at any time to be lavish of our employers' property, this is a period for all to be careful and thrifty."

A True Crane Story.

Cranes, when built by ignorant or inexperienced engineers, are somewhat apt to fail at critical moments. Some years ago, a large crane of a novel design had been built to run along a wharf, and discharge a ship's cargo into the railroad cars. The crane was an enormously lofty structure spanning a line of track, and the hoisting and swinging machinery was situated some 20 ft. above the rail level. The Chief Draftsman knew something of mechanical engineering, but very little about cranes. The Manager of the works knew very little about mechanical engineering, and nothing about cranes. Consequently the first crane of the kind was tried with a full test load on the edge of a wharf where the water was full 25 ft. deep. The Manager, who was deaf, and a fitter were up in the crane controlling its movements. As the test load rose in the air, the fitter heard a suspicious cracking, and ran for dear life and solid ground. The Manager, being deaf, continued to smile blandly, and consequently was hurled, crane, load, chains, crabs, and all mixed up together into the water, and only brought up in the mud at the bottom, where he stuck fast. The water seethed and boiled, the bubbles rose, and then all was silence. Nothing but the deaf man's hat floated on the surface. This was serious, so a diver went down, and catching hold of a stray boot leg, succeeded in inducing a battered manager to follow it.

Nine months in hospital were required to mend two broken legs, a broken arm, some cracked ribs and other minor injuries. This gentleman still builds crane for use on wharfs, but makes the axles on which they travel over 2 in. in diameter, and watches the tests from a prudent distance. As the Irish editor of an esteemed contemporary says when he commences to relate another anecdote, "This *is* true." We may add that it did not happen in the United States.

A Torchlight Procession by Rail.

A dispatch from Leavenworth, Kan., Oct. 10, says: "A serious accident occurred on the excursion train from here to Atchison to attend the Republican rally Wednesday night. Several hundred dollars' worth of fire-works were stored in one end of a car filled with passengers and accidentally caught fire. The car became at once a fiery furnace, with rockets shooting in every direction. Those nearest the fire-works had to jump through the windows. Sheriff Keller was seriously burned and deputy County Treasurer Krezdorn was cut and badly burned. The car was set on fire and ruined."

On the Boston Train.

A New York young woman was en route for Boston on her first visit.

"Can you tell me, please," she said to a lady in the chair ahead, "if Springfield is where the trains stop for refreshments?"

"No, madame," was the response; "Springfield is where the passengers stop for refreshments."

She had run up against a Bostonian the very first thing.

New Infernal Machine.

Public confidence in the ham sandwich, that conspicuous feature of railway refreshment-room fare, has been steadily undermined during the last few years, but has now received a new and severe blow. The fact that bread is often made with flour containing alum, lime and other unpalatable minerals first excited suspicions which later revelations as to the nature and wide use of oleomargarine enhanced. Then vague alarm was aroused by the discovery that a serious danger might lurk in the tender ham. Now comes the startling announcement that the mustard of commerce is often adulterated with naphthal yellow, which is not only a poison but a dangerous explosive also. The case against the sandwich, therefore, seems complete. Having forfeited all claim to popular trust and affection, it should be consigned to the realm of Orsini bombs, infernal machines and other devices of conspirators.—*Exchange.*

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Central Massachusetts, annual meeting, in the Boston & Lowell station in Boston, Oct. 29.

Cincinnati, Indianapolis, St. Louis & Chicago, annual meeting, at the office in Indianapolis, Oct. 28, at noon.

East Tennessee, Virginia & Georgia, annual meeting, at the office in Knoxville, Tenn., Nov. 12.

Louisville, New Orleans & Texas, special meeting, in Memphis, Tenn., Nov. 10.

Manhattan, annual meeting, at the office in New York, Nov. 12, at noon.

Memphis & Charleston, annual meeting, in Huntsville, Ala., Nov. 13.

New York, Lake Erie & Western, annual meeting, at the office in New York, Nov. 25.

Philadelphia & Reading, annual meeting, at the office in Philadelphia, Jan. 12, 1885. The registry of stock closed Oct. 12.

Rochester & Pittsburgh, annual meeting, at the office, No. 20 Nassau street, New York, Nov. 12.

Dividends.

Dividends upon the capital stocks of railroad companies have been declared as follows:

Boston & Providence, 4 per cent., semi-annual, payable Nov. 1 to stockholders of record on Oct. 18.

Manchester & Lawrence, 5 per cent., semi-annual, payable Nov. 1.

Oregon Railway & Navigation Co., 1½ per cent., quarterly, payable Nov. 1. Transfer books close Oct. 21.

Pullman's Palace Car Co., 2 per cent., quarterly, payable Nov. 15. Transfer books close Nov. 1.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car-Builders' Club* will hold regular meetings at its rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month.

The *New England Railroad Club* will hold its regular meetings at its rooms in the Boston & Albany station in Boston, on the evening of the fourth Wednesday in each month.

The *Western Railway Club* will hold regular meetings at its rooms, No. 103 Adams street, Chicago, on the third Wednesday in each month.

Baltimore & Ohio Employes' Relief Association.

The September sheet of this Association shows the payment of 760 benefits in all, as follows: Main Stem, Transportation Department, 113; Machinery Department, 223; Road Department, 97; Baltimore & Philadelphia, 1; Trans-Ohio Divisions, 184; Pittsburgh Division, 44; physicians' bills, 98; total, 760. The largest payments were two of $1,000 each, to the widow of A. J. Horner, laborer, and the sister of James Hamilton, brakeman. Both of these men were accidentally killed.

Brotherhood of Locomotive Engineers.

The Brotherhood of Locomotive Engineers closed its annual convention in San Francisco last week, after the transaction of the usual business. It was decided to hold next year's convention in New Orleans. The business sessions were private, as usual, so that no report of the proceedings can be given.

The delegates were well entertained by the members of the Brotherhood and other friends in San Francisco and the convention was a very successful one.

Order of Railway Conductors.

The Grand Division of the Order of Railway Conductors began its annual meeting in Boston, Oct. 21. Several hundred members from the United States and Canada were in attendance. The annual report of the Grand Secretary shows that 61 new divisions were organized last year, making a total of 150 divisions with a membership of 6,000. The number of members nearly doubled during the year ending Oct. 1. The receipts for the year were $16,692, the expenditures $14,078, and the balance on hand Sept. 30 was $4,145.

Master Car-Builders' Club.

At the meeting of the Master Car-Builders Club in New York, Oct. 16, to make arrangements for the winter season, it was resolved to hold regular meetings on the evening of the third Thursday in each month, as heretofore, at the rooms No. 113 Liberty street. The following subjects were agreed upon for special discussion at each meeting:

November: Safety Couplers for Freight Cars.
December: Car Wheels.
January: Heating, Lighting and Ventilating Passenger Cars, including Safety Hatches in Car Roofs.
February: Standard Car Body and Trucks for Freight Service.
March: The Present Condition of Cars offered for Interchange of Traffic.

The April meeting is left open for discussion of any subject which may arise.

All railroad men and others interested in the subjects which are to be discussed are invited to attend these meetings.

American Street Railroad Association.

The third annual meeting of the American Street Railroad Association was held in New York, Oct. 17 and 18. There was a larger attendance than at any previous meeting of the Association.

Papers were read on the use of salt in removing snow and ice from railroad tracks, on electric motors, and on cable railroads, and discussions were had on these subjects and on others of interest to officers of street railroads. A general belief was expressed that electricity would in future become the leading motor for this class of roads, but at the same time it was considered that many improvements would be necessary upon the present methods, before this would be the case.

Many members of the Association made a visit to the Brooklyn Bridge for the purpose of inspecting the cable system in use there. The meeting closed with a dinner at which over 100 members and visitors were present. The next convention will be held in St. Louis in October, 1885.

Western Society of Engineers.

The 195th meeting was held in Chicago, Oct. 7, President Cregier in the chair.

Upon ballot, Mr. John Saltar, Jr., was elected a member.

Mr. Liljencrantz, for the Committee on Revision, submitted a report embodying several amendments to the constitution and by-laws.

The amendments proposed by the committee to Article IV. and V. of the constitution were seconded by the requisite two-thirds vote.

The amendments proposed by the committee, as amended, to Articles IV. and V. of the by-laws were received, and it was voted that a letter ballot should be taken on the proposed amendments to the constitution and by-laws at the second meeting in November.

The following was adopted:

"*Resolved*, That members are hereby requested to send to the Secretary, on or before Dec. 2, written nominations for the officers to be elected at the annual meeting Jan. 6, that the nominations so received be read at the meeting Dec. 2, and that the two names receiving the largest number of proposers shall be declared the nominees for the respective offices."

Adjourned.

American Society of Civil Engineers.

At the Meeting of this Society held in New York on Oct. 1, Mr. H. Trueman Wood, Secretary of the Society of Arts, London, England, presented a short statement in reference to the International Inventions Exhibition, which it is proposed to hold in London during 1885. He expressed the desire of the management of the Exhibition that the Engineers of America should know of this exhibition and aid in securing its success. It is one of the series of exhibitions which are in progress, that of last year being devoted to theories, and that of the present year to subjects connected with health and education. The Exhibition of 1885 will be devoted to apparatus, appliances, processes and products invented or brought into use since 1862. It is intended to illustrate industrial processes, and not to exhibit finished products unless required for full demonstration of a particular process. The Exhibition will be under the presidency of the Prince of Wales. The Chairman of the Executive Committee is Sir Frederick J. Bramwell, Vice-President Inst. C. E. Copies of a detailed prospectus were presented by Mr. Wood.

The death on Sept. 25 of Isaac Newton, M. Am. Soc. C. E., was announced.

A paper by F. B. Stearns, M. Am. Soc. C. E., "Experiments on the flow of water throug a 48-in. pipe," was read.

Engineers' Club of Philadelphia.

A special business meeting was held at the rooms in Philadelphia, Oct. 4, Past President Frederic Graff in the chair; 21 members present.

The board of directors presented their minutes as the report of routine business transacted since last business meeting and made special report of a communication from the board of managers of the Association of Engineering Societies. This communication cordially invited the club to unite with the Association and publish its *Proceedings* with those of the societies now members thereof. The board had considered it, and had unanimously decided that no change in present policy of publication was advisable, but referred the matter to the Club, that a more general expression of opinion might be obtained. The meeting sustained and indorsed the action of the board, without a dissenting vote, and instructed the Secretary to notify the board of managers of the Association of their action, and to assure them of our high appreciation of their courtesy and consideration, and of the standing and value of their publication.

A communication from the New York & New Jersey Branch of the International Institute for Preserving and Perfecting Anglo-Saxon Weights and Measures, requesting our assistance in promoting the objects of the Institute, was presented and laid upon the table.

The thanks of the club were returned to Hon. Wm. B. Smith, Mayor of Philadelphia, for the report of the Board of Experts on Street Paving, Philadelphia, 1884, and to Mr. John McArthur, Jr., architect of the City Hall, Philadelphia, for the phototypes of that building, which documents these gentlemen had kindly placed at the service of members desiring them; and also, to Capt. S. C. McCorkle, member of the club, assistant in charge of Philadelphia office of U. S. C. and G. Survey, for his considerate invitation to our members to make use of the special facilities for information as to this branch of government work afforded by his office.

The Secretary presented, for Mr. S. N. Stewart, a description of a gravity elevated railway, the stations of which are placed at summits in the grade that the trains may be slackened and stopped by gravity and the elevation thus gained utilized in the further gravity propulsion of the train. A compound wheel is also proposed to lessen the rolling friction. Among the advantages noted are, avoiding the annoyances of locomotives and heavier construction to provide for their weight; that cars could be run singly as cheaply as in trains, economy in running expenses, etc.

The tellers of election reported that the following gentlemen had been elected active members of the Club: S. C. McCorkle, Edw. H. Williams, D. C. Barber, O. E. Michaelis, J. B. Hutchinson, C. R Claghorn, Harry C. Smith, F. H. Bowen, Jr., W. B. Riegner and John Birkenbine.

Southern Railway & Steamship Association.

The annual convention of this association was held in Atlanta, Ga., Oct. 15. There were present Joseph E. Brown, President; Virgil Powers, General Commissioner; Charles A. Sindal, Secretary of the Association, and the following representatives of railroad and steamship companies and members of the Association: W. H. Stanford, Secretary and General Freight Agent of the Old Dominion Steamship Co.; J. R. Ogden, General Freight Agent East Tennessee, Virginia & Georgia; G. A. Whitehead, General Freight Agent Central of Georgia; H. Colbran, General Freight Agent Cincinnati, New Orleans & Texas Pacific; J. M. Culp, General Freight Agent Louisville & Nashville; Sol. Haas, Traffic Manager of the Associated Lines of Virginia and the Carolinas; J. M. Brown, General Freight Agent Western & Atlantic; E. R. Dorsey, General Freight Agent Georgia Railroad; James L. Taylor, General Freight Agent Savannah, Florida & Western; S. B. Pickens, General Freight Agent South Carolina Railroad; Thomas H. Carter and John Screven, arbitrators Southern Railway & Steamship Association; Theo. Welch, General Passenger Agent Louisville & Nashville; D. Cardwell, Assistant Freight Agent Charlotte, Columbia & Augusta; L. L. McClesky, Assistant General Freight Agent Richmond & Danville; W. S. Freeman, Examiner of Records; and T. E. Walker, Auditor Southern Railway & Steamship Association. W. G. Raoul, President, and W. F. Shellman, Traffic Manager Georgia Central; John B. Peck, General Manager South Carolina; C. S. Gadsden, Superintendent, and S. C. Boylston, General Freight Agent Charleston & Savannah; A. L. Rives, Vice-President and General Manager Richmond & Danville; Henry Fink, Vice-President and General Manager East Tennessee, Virginia & Georgia; J. W. Green, General Manager Georgia Railroad; M. H. Smith, President Louisville & Nashville; J. W. Thomas, President, and Geo. R. Knox, General Freight Agent Nashville, Chattanooga & St. Louis; Eben Hillyer, President Rome Railroad; R. G. Fleming, General Superintendent Savannah, Florida & Western; R. A. Anderson, Superintendent Western & Atlantic; Hon. R. R. Bridgers, President, J. S. Devine, General Superintendent, T. M. Emerson, General Freight Agent Wilmington, Columbia & Augusta, and Wilmington & Weldon; T. G. Eger, General Freight Agent Clyde lines.

General Commissioner Powers submitted his annual report, which was read. The portions of the report relating to the agreement were referred to the Executive Committee, which, after full consideration, reported to the convention the agreement which was in force during the past year, with the exception of a change in the fiscal year of the Association, which is to end on May 31 instead of Aug. 31, and the Association year to end with July instead of December. The Committee also recommended that the annual meetings be held on the second Wednesday in July instead of the third Wednesday in October. A paragraph was inserted in the agreement to provide for the pooling of western business to Ohio River and Southern points by the roads interested when desired. The report of the Committee was approved and the agreement as amended so adopted. The old officers were re-elected for the ensuing year and the meeting adjourned, after an unusually harmonious session.

RATE COMMITTEE.

A meeting of the Rate Committee was held previously to the annual convention to consider several matters submitted for its consideration. The first of these was a memorial from the truck and fruit growers of South Georgia and Florida, who asked for more favorable rates on watermelons

and fruit generally and for some changes in the existing regulations as to their shipment. The matter was referred to a special committee, which will, it is understood, give hearings to the fruit growers at convenient points. The question of pooling the interior eastern business was also considered. It was agreed that this business should be pooled, but no definite plan was adopted.

Another meeting of the Committee was held after the adjournment of the general convention, at which the subject of pooling the interior eastern business was again brought up and more fully considered. Arrangements were completed for the formation of the new pool, and the committee then adjourned.

ELECTIONS AND APPOINTMENTS.

American Street Railroad Association.—At the annual convention in New York last week the following officers were chosen: President, C. A. Richards, Boston; Vice-Presidents, J. S. Walsh, St. Louis; Henry M. Watson, Buffalo, and Edward Lusker, Montreal; Secretary and Treasurer, Wm. J. Richardson, Brooklyn; Executive Committee, B. Du Pont, Toledo, and Wm. White, New York.

Central Pacific.—The following circular from the President's office is dated San Francisco, Oct. 1:

"Mr. J. C. Stubbs is hereby appointed General Traffic Manager of this company. Appointment to take effect from this date.

"The General Freight Agent and the General Passenger and Ticket Agent, will report to the General Traffic Manager. The General Traffic Manager will report to the General Manager."

Mr. Stubbs was for a long time General Freight Agent of the road, but for some time past his title has been Freight Traffic Manager. The new appointment extends his authority over the Passenger Department also.

Chicago & Atlantic.—Mr. Charles J. Domville has been appointed Master Mechanic in place of G. A. Hill, resigned. Mr. Domville was formerly on the Grand Trunk road.

Cincinnati, New Orleans & Texas Pacific.—Mr. P. Nolan has been appointed General Road-master for all this company's lines.

Gulf, Colorado & Santa Fe.—Mr. W. S. Davis has been chosen Secretary of this company in place of Mr. F. P. Killeen, resigned. Office in Galveston, Texas.

Manhattan Beach.—This company has elected Austin Corbin President; J. R. Maxwell, Vice-President; Charles Bruff, Secretary and Treasurer.

Michigan & Ohio.—At the annual meeting in Toledo, O. recently, the following directors were chosen: George Ingersoll, Marshall, Mich.; Daniel P. Eels, J. A. Latcha, Cleveland, O.; C. R. Cummings, W. B. Howard, Chicago; W. H. Brown, Calvin S. Brice, E. H. R. Lyman, John T. Martin, Samuel Shethar, Samuel Thomas, New York.

New England General Passenger & Ticket Agents' Association.—At a meeting held in Boston, Oct. 15, the following officers were elected for the ensuing year: President, F. E Brown, Concord Railroad; Vice-President, James Littlefield, Boston & Baltimore Steamship Co.; Secretary, C. A. Waite, Worcester, Nashua & Rochester; Member of Executive Committee, C. H. Foye, Portland & Ogdensburg.

New York, Lake Erie & Western.—At a meeting of the board in New York, Oct. 16, Messrs. John King, J. G. McCullough, Ogden Mills and James A. Raynor were chosen directors in place of Theron R. Butler and Thomas Dickson, deceased, James D. Fish and Jacob F. Schiff, resigned. Mr. Jewett's resignation was accepted, to date from Nov. 1, and Mr. John King was chosen President, to take effect the same date.

Olean, Bradford & Warren.—At the annual meeting in Olean, N. Y., Oct. 18, the following directors were chosen: E. A. Rollins, Philadelphia; Calvin H. Allen, C. N. Clark, G. Clinton Gardner, B. K. Jamison, A. N. Martin, Isaac N. Seligman, New York. The road is leased to the Buffalo, New York & Philadelphia.

Pittsburgh Junction.—Mr. Chas. H. Baker has been appointed Agent of this road at Junction Transfer station, and will act as Joint Agent of the Pittsburgh & Western and the Baltimore & Ohio railroads.

Pullman's Palace Car Co.—At the annual meeting in Chicago, Oct. 17, the following directors were chosen: John Crerar, J. W. Doane, Marshall Field, Henry C. Hulbert, George M. Pullman, O. S. A. Sprague, Norman Williams. The only new director is Mr. Sprague, who succeeds C. G. Hammond, deceased. The board re-elected George M. Pullman President, with all the other old officers.

Southern Railway & Steamship Association.—At the annual convention in Atlanta, Ga., Oct. 15, the following officers were chosen for the ensuing year: President, Hon. Joseph E. Brown; General Commissioner, Virgil Powers; Secretary, C. A. Sindall; Auditor, Milo S. Freeman; Claim Agent, T. E. Walker; Arbitrators, John Screven, Thomas H. Carter and E. K. Sibley. There is no change from last year.

Toronto, Grey & Bruce.—This company has elected Wm. Hendrie President; E. B. Osler, Vice-President. The road is leased to the Ontario & Quebec.

Union Pacific.—Mr. J. O. Brinkerhoff is appointed Superintendent of the Kansas Central Branch, with office at State Line, Kansas.

PERSONAL.

—Mr. F. D. Anderson has resigned his position as President of the Ottawa, Waddington & New York Co., which was organized a short time ago.

—Mr. Edward Mulligan, for many years Assistant Road-Master of the Boston & Maine road, died Oct. 19 at his home in Dover, N. H., aged 65 years, after a brief illness.

—Mr. C. Berkeley Powell, having resigned his position as Master Mechanic of the Old Colony Railroad, was recently presented by the employés in his department with an elegant watch and chain. Mr. and Mrs. Powell leave Boston for California, where they will spend the winter.

—Mr. George W. Lilley has resigned his position as General Freight Agent of the Missouri Pacific road, to take effect Nov. 1. He retires in order to secure much needed rest and in the hope of benefiting his health. It is said that the company will not fill his position, but leave it open for him for some months in case he wishes to return.

—Mr. Nelson Van Valkenberg, for a number of years Passenger Agent of the New York, Lake Erie & Western road in Buffalo, died in that city Oct. 17, aged 70 years. Mr. Van Valkenberg had been connected with railroads for 45 years, having begun work in 1839 as baggage-master on the old road between Albany and Schenectady. He remained in the employment of the New York Central until about seven years ago, when he accepted the position he lately held in the Erie.

—Col. Vernon K. Stevenson died in New York, Oct 16, aged 72 years. He was born in Russellville, Ky., and when a young man, went to Nashville, Tenn., and began life as clerk in a store. Through industry and ability he gradually rose until he became head partner in a large dry goods house, and retired with a considerable fortune before he was 40 years old. Soon afterward he began to take an interest in railroad matters, and was one of the first projectors and directors of the Nashville & Chattanooga road. Soon after the first organization he was elected President of the company, and retained that office for nearly 25 years. He was also largely interested in the building of the Memphis & Charleston Railroad, and the town of Stevenson, at the junction of the two roads, was named after him. When the Southern Pacific road was projected and first organized, Mr. Stevenson served for a time as its President. During the war he served in the Confederate army for a time as quartermaster, and was Division Quartermaster on Gen. A. S. Johnston's staff. After the close of the war he was occupied busily for several years in the reconstruction of the Nashville & Chattanooga road and in the settlement of the difficulties arising out of the war. Several years ago he removed from Nashville to New York and retired from all active connection with the railroads in which he was interested. In New York he invested a considerable amount in real estate, but did not engage in any active business, living quietly in his own house. For the last year or two he has left the management of his affairs largely in the hands of his son, Mr. Vernon K. Stevenson, Jr., who survives him and who has represented him in railroad and other business matters.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1884.	1883.	Inc. or Dec.	P.c.
Nine months ending Sept. 30:				
Ala. Gt. South.	$775,083	$741,433	I. $33,650	4.5
Cin., N. O. & T. P.	1,800,939	1,866,750	I. 24,189	1.3
Char., Col & A.	511,124	570,671	D. 59,637	10 4
Col. & Greenville.	418,744	515,922	D. 97,178	19.0
Des M. & Ft. D.	256,994	238,530	I. 18,464	7.7
Nash., C. & St. L.	1,761,432	1,711,915	I. 49,517	2.9
Net earnings.	768,260	780,657	D. 12,397	1.6
N. O. & Nor'east.	268,606	69,190	I. 199,416	289.0
Rich. & Dan.	2,706,559	2,716,974	D. 10,415	0.4
Texas & St. L.	649,137	.....	.....	...
Utah Central.	756,212	857,872	D. 101,660	11.9
Va. Midland.	1,184,474	1,244,536	D. 60,062	4.8
Vicksburg & Mer.	332,717	336,753	D. 4,036	1.2
Vicks., Shreve. & Pacific	134,210	70,405	I. 63,805	90.6
Western N. C.	321,145	268,115	I. 53,030	19.8
Eight months ending Aug. 31:				
Central Pacific.	$14,385,503	$15,848,884	D. $1,463,381	9.2
Net earnings.	3,916,007	5,594.105	D. 1,678,098	30.0
Seven months ending July 31:				
So. Pac., No. D.	$766,887	$692,301	I. $74,586	10.7
Month of July:				
So. Pac., No. D.	$152,608	$130,645	I. $21,963	16.7
Month of August:				
Central Pacific.	$2.113,339	$2,267,543	D. $154,204	6.8
Net earnings.	710,004	918,912	D. 208.908	11.8
Cin., Ind., St. L. & Chi.	244.117	246,517	D. 2.400	0.9
Net earnings.	98,199	103,963	D. 5,764	5.5
Month of September:				
Ala. Gt. South.	$95,269	$96,386	D. $1,117	1 2
Cin., N. O. & T. P.	237,508	239,787	D. 2,279	0.9
Char., Col. & A.	64,276	71,411	D. 7,135	10.0
Col. & Greenville.	51,130	64.849	D. 13,719	21.1
Des M. & Ft. D.	42,873	40.102	I 2,771	6 9
Nash., C. & St. L.	210,585	197,799	I. 12,786	6.4
Net earnings.	95,688	91,856	I. 3,832	4.0
N. O. & Nortn.	27,434	11,164	I. 16,270	145.3
Rich. & Dan.	337,387	362,292	D. 24,905	6 9
Texas & St. L.	116,390	.....	.....	...
Utah Central.	98,592	104.768	D. 6.176	5.9
Virginia Midland.	170,268	185,505	D. 15.237	8.2
Vicksburg & Mer.	41,662	45,370	D. 3,708	8 2
Vicks., S. & P.	34,770	19,389	I 15,381	80.3
Western N. C.	45,698	46,241	D. 543	1.2
First week in October:				
Ches. & Ohio.	$61,172	$83,382	D. $22,210	26.8
Cin., Ind., St. L. & Chi.	53,683	55,557	D. 1,874	3.4
Flint & Pere M.	41,840	51,966	D. 10,126	19.4
Ill. Central.	220,221	248,483	D. 19,262	7.7
Iowa lines.	33,900	47,583	D. 13,683	28 5
Kansas City, Ft. Scott & Gulf.	42,830	40,815	I. 2,015	4.9
Kan. City, Spr. & Mem.	22,176	.....	.....	...
Ohio Central.	20,681	29.671	D. 8,990	29.9
Wis. Central.	26,774	30,758	D. 3,984	12.8
Second week in October:				
Canadian Pac.	$146,000	$128,000	I. $18,000	14.1
Chi. & Alton	231,232	232,409	D. 1,177	0.5
Chi. & East. Ill.	33,633	34.111	D. 478	1.4
Chi., Mil. & St. P.	553,000	567,242	D. 14.242	2.5
Chi. & Nor'west.	535,990	592,300	D. 56,310	9.5
C., St. P., M. & O.	141,200	140,800	I. 400	0.3
Cin., Ind., St. L. & Chic	51,065	55,557	D. 4,492	8.1
Louisv. & Nash.	291,655	328,870	D. 37,215	11.3
Mil., L. S. & W.	25,550	25,065	I. 485	1.9
Mil. & Northern.	12,690	11,560	I. 1,130	9.8
North. Pacific.	328,087	312,100	I. 15,987	5.1
Roch. & Pitts.	26,178	17,020	I. 9,158	53.8
St. L. & San Fran.	111,600	77,400	I. 34,200	44.4
Wab., St. L & P.	377,000	374,781	I. 2,219	0.6

Weekly reports of earnings are usually estimated in part, and are subject to correction by later statements.

Grain Movement.

For the week ending Oct. 11, receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the past nine years:

Year.	North-western receipts.	—Northwestern shipments.— Total.	By rail.	P. c. By rail.	Atlantic. receipts.
1876	5,352,363	4,474,484	1,800,837	40 4	4,059,398
1877	5,101,813	5,041,757	1,152,962	22.9	6,095,691
1878	5,083,770	5,060,208	1,486,915	29.4	5,904,356
1879	7,180,077	7,240,224	1,868,589	25.8	8,942,726
1880	9,274,351	7,416,234	2,132,599	28.7	6,623,721
1881	5,642,568	3,912,984	1,010.061	51.4	3 801,659
1882	5,002,829	4,153,519	1,800.081	43.3	3,363,498
1883	7,301,910	6,294,098	2,456,846	39.0	3,910,160
1884	7,614,288	5,783,481	2,504,445	43.3	4.590,498

Thus the receipts of the Northwestern markets for the week this year were 312,000 bushels more than in the corresponding week of last year, and more than in any other year except 1880. They were, however, 1,071,000 bushels more than in the previous week of this year, and were the smallest for five weeks. The decrease from the previous week was almost wholly at Chicago, and wholly in corn, the receipts of which had been greatly stimulated for some weeks by a corner.

The shipments of these markets for the week were 511,000 bushels less than last year, more than in 1882 or 1881, and much less than in 1880 or 1879. They were a little less than the week before. The rail shipments were nearly the same as the week before, though the Chicago report showed them to be considerably greater from that port. The shipments down the Mississippi amounted to 111,411 bushels.

The receipts of the Atlantic ports for the week were *larger* this week than in the corresponding week of any year previous since 1880, which has not happened before for a long time; they were, however, much less than in any of the four years from 1877 to 1880, and little more than half as great as in 1879. They were slightly greater than in the previous week of this year and about equal to the average of the past five weeks.

Exports from Atlantic ports for the week to Oct. 11 were:

	1880.	1881.	1882	1883.	1884.
Flour, bbls.	167,014	72,749	170,764	200,678	143,901
Grain, bu.	6,165,014	2,116,304	2,226,122	1,791,176	967,270

Thus the exports were much less this year than in any of the other four. They were also much less than in any other week of this year.

Coal.

Coal tonnages for the week ending Oct. 11 are reported as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Anthracite	788,640	730,512	I. 58,128	7.9
Eastern bituminous	210,017	185,662	I. 24,355	13.1
Coke	40,860	62,545	D. 21,685	34.7

The anthracite market is improving somewhat, the colder weather causing some pressure to buy. The October stoppage of mining is to be followed bo a suspension of one week in November and two in December. It is said that the Reading and the Lackawanna opposed this action at first, but finally gave way.

The coal tonnage of the Pennsylvania Railroad for the week ending Oct. 11 was:

	Coal.	Coke.	Total.
Line of road	143,817	37,800	181,617
From other lines	59,793	3,060	62,853
Total	203.610	40,860	244.470

The total tonnage this year to Oct. 11 was 10,247,415 tons; to the corresponding date last year it was 9,397,339 tons, showing an increase this year of 850,076 tons, or 9.0 per cent.

Cumberland coal shipments for the week ending Oct 18 were 63,703 tons. The total shipments this year to Oct. 18 were 2,280,229 tons, against 2,029,893 tons to the corresponding date last year; an increase of 250,336 tons, or 12.3 per cent.

The Philadelphia City Council recently appointed a Committee on Railroad Discriminations, and that committee has resolved to report to the Council in favor of some action in relation to discrimination in the rates on coal which is charged against the Pennsylvania and the Philadelphia & Reading companies. What action will be taken finally by the Council is uncertain, but very probably the case will be referred to the Attorney General of the state for action under the state law.

San Francisco coal receipts for the nine months ending Sept. 30 were: English coal, 76,461; Australian, 82,157; Eastern (anthracite and Cumberland), 25,917; Pacific Coast, 431,629; total, 616,164 tons. The English and Australian coal is chiefly brought as ballast by vessels coming after wheat.

Anthracite coal tonages for September and the nine months ending Sept. 30 are reported as follows by Mr. John H. Jones, the Official Accountant, the statement including the entire production of anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines:

	—September— 1884	1883	—Nine months— 1884	1883
Philad'a & Read.	982.447	1,171,187	7,975,657	8,906.275
Lehigh Valley	498,140	606,140	4.241.349	4,568,221
Del., Lack. & W.	432,686	472,933	3,716,033	3,675,135
Del., & Hud. Canal Co.	333,825	359,160	2,426,912	2.530,865
Pennsylvania R. R.	295,095	273,776	2,354.268	1,989,887
Penn'a Coal Co.	121,735	154,129	996,404	1,096,595
N. Y., L E. & W.	43,962	47,030	281,654	268,542
Total	2,677,890	3,084,355	21,992,367	23,035,521

The Jersey Central tonnage is included with that of the Philadelphia & Reading for the whole of both years. Lehigh Valley tonnage includes that of the State Line & Sullivan road, which was 7,013 tons in September. In addition to the tonnage above there were 57.310 tons transported from mines by the Delaware & Hudson Canal Co. during September, which is included in tonnage of other interests.

The decrease for the month was 406,455 tons, or 13.2 per cent.; for the nine months, 1,043,153 tons, or 4 5 per cent. For September the Pennsylvania Railroad alone shows an increase; for the nine months the Delaware, Lackawanna & Western, the Pennsylvania Railroad and the Erie show gains, the others losses.

The percentage of the total tonnage furnished by each company for the nine months was as follows:

	1884.	1883.	Inc. or Dec.
Philadelphia & Reading	36 3	38.7	D. 2.4
Lehigh Valley	19.3	19.8	D. 0.5
Delaware, Lackawanna & Western	16.9	15.9	I. 1.0
Delaware & Hudson Canal Co	11.0	11.0	... ...
Pennsylvania Railroad	10.7	8.6	I. 2.1
Pennsylvania Coal Co.	4.5	4 8	D. 0.3
N.Y., Lake Erie & Western	1.3	1.2	I. 0.1
Total	100.0	100.0	... ...

The stock of coal on hand at tide-water shipping points, Sept. 30, 1884, was 885,591 tons; on Aug. 31, 1884, 885,715 tons; decrease, 124 tons during the month.

The Colorado-Utah Association.

A dispatch from Chicago, Oct. 21, says: "At a meeting here yesterday of the roads in interest, what will hereafter be known as the Colorado-Utah Association, provided for at the meeting held a few days ago, was formed to embrace all Colorado and Utah traffic to and from and through all Mississippi River points between and including Minneapolis and Cairo."

Cotton.

Cotton movement for the week ending Oct. 17 is reported as follows, in bales:

	1884.	1883.	Inc. or Dec.	P. c.
Interior markets:				
Receipts	139,448	158,539	D. 19.091	12.0
Shipments	114.902	120,474	D. 5,572	4.6
Stock, Oct. 17.	92,654	202,970	D. 110,316	54.3
Seaports:				
Receipts	242.289	257,276	D. 14.937	5.1
Exports	117,515	105,247	I. 12,268	11.7
Stock, Oct. 17	453.141	632,849	D. 179,708	28.4

The actual movement from plantations for the cotton year (from Sept. 1) to Oct. 17 is estimated at 989,078 bales; the decrease, as compared with last year, is 185,112 bales; the decrease, as compared with 1882, is 90,561 bales, and with 1881, 233,852 bales.

Passenger Rates.

West-bound passenger rates from New York are generally demoralized. The West Shore, the Lackawanna and the Erie have made an open reduction of rates to $15 to Chicago, and it is thought that tickets are sold at the outside offices at much lower rates. The New York Central has fixed its Chicago rates for the present at $16.50, but it is understood that it is ready to meet any reduction made by the other lines. The Pennsylvania Railroad has so far taken no very active share, although its tickets are sold at outside offices at considerably below the regular rates. A further reduction in through fares is not at all improbable.

The West Shore has made a general reduction of about 50 per cent. in local rates between New York and points upon its own line, and this reduction has been met by the New York Central. The present rate from New York to Buffalo by both roads is $4.65, and it is reported that further cutting will be made by both roads. The Lackawanna has reduced its rates to Buffalo and to all competing points also, and the Erie announces that it will meet any rate made by other lines to competing points.

East-bound rates from Chicago have not been openly cut by the companies, but tickets are sold at the outside offices, doubtless with the consent of the companies, at as low rates as those prevailing in New York. At intermediate points there is also a great deal of cutting, tickets being sold from Buffalo to Chicago as low as $7, and heavy reductions are also being made in the rates from Chicago to intermediate points. Whether any further reduction will be made in local fares is uncertain, but the probability is that cutting to all important points, such as Buffalo, Rochester and Syracuse will be continued and that extremely low rates will be made. East-bound rates are also cut at St. Louis.

Western Trunk Lines Association.

In Chicago, Oct. 21, new tariffs were issued by the Western Trunk Lines Association omitting the Chicago & Northwestern road. This is taken to signify that the Northwestern road is considered to have withdrawn or been dropped from the association on account of its action in refusing to report business from the Sioux City & Pacific line, and some trouble is anticipated on this account.

California Through Freights.

Shipments of through freight eastward by rail from California points in August, were as follows, in tons:

	1884. Tons.	Per cent.
Central Pacific	11,076	69.6
Southern Pacific	4,834	30.4
Total	15,910	100.0

Of the total shipments 11,722 tons were from San Francisco, and 4,188 tons from interior points. Leading items of freight were 5,215 tons sugar, 1,258 tons canned goods, 842 tons wool and 757 tons tea.

The Ontario National Line.

Arrangements have been completed to organize a new fast freight line under this name. It will run over the Central Vermont, the Ogdensburg & Lake Champlain, the Rome, Watertown & Ogdensburg, the Michigan Central, the Wabash, St. Louis & Pacific and other connecting lines.

RAILROAD LAW.

Income Bonds—Option to Pay Interest in Scrip.

In the case of Marlor against the Texas & Pacific Co., the United States Circuit Court in New York recently held as follows:

1. Where a promise is in the alternative, to pay in money or in some other medium of payment, the promisor has an election either to pay in money or the equivalent, and after the day of payment has elapsed without payment, the right of election on the part of the promisor is gone, and the promisee is entitled to payment in money.

2. By the terms of bonds issued in 1875, by the Texas & Pacific Railroad Co., the company acknowledged itself to be indebted to the holder in the sum named therein, which it promised to pay to ——, or assigns, at the office of the company in New York, on Jan. 1, 1915, with interest thereon at 7 per cent. per annum, payable annually on July 1, of each year, as provided in the mortgage on the lands of the company, and upon the net income derived from operating its road east of Fort Worth, by which payment was secured. The bonds further provided that in case such net earnings should not, in any one year, be sufficient to enable the company to pay 7 per cent. interest on the outstanding bonds, then scrip might, at the option of the company, be issued for the interest, such scrip to be received at par and interest, the same as money, in payment for any of the company's lands, at the ordinary schedule price, or it might be converted into capital stock of the company when presented in amounts of $100 or its multiple. The mortgage was silent as to payment of interest or principal, except that it authorized the trustees to sell the lands if default was made in the principal sum at maturity of the bonds, and apply the proceeds to satisfy the amount due. Held, that the mortgage did not qualify or control the absolute promise in the bonds to pay interest in money or in scrip; that the bondholders were entitled to payment of interest in money, if earned, or, if it was not earned, to the scrip, on the day at which, by the terms of the bonds, the company was to pay the interest, or exercise its alternative; and that after that day had elapsed, without an election by the company, they were entitled to be paid in money, and could maintain an action to recover the same, although no presentment of the bond or demand of payment had been made.

The Tennessee Bond Cases.

In the United States Supreme Court at Washington, Oct. 20, the cases of Calvin A. Stevens, John Kelly and others against the Memphis & Charleston and other companies were advanced on the docket, and the argument upon them will begin during the present week. These are the suits brought to enforce the lien of the bonds issued by the state of Tennessee in aid of certain railroads upon the roads themselves, the bonds having been repudiated by the state, and the decisions will affect a number of companies and a large amount of property.

OLD AND NEW ROADS.

Baltimore & Ohio.—Work on the new Philadelphia Extension is progressing very favorably. The grading through Delaware is nearly finished and only a little bridge work remains to be done on that section of the road. Tracklaying was begun last week at the junction with the Delaware Western road near Kiamensi and the rails are down from that point to Red Clay Creek, about five miles. Ballasting is being completed as fast as the rails are laid. The intention is to have the section through Delaware, 21 miles, all completed by Jan. 1 next in order to comply with the requirements of the charter.

Baltimore & Ohio and the Pennsylvania.—In the Circuit Court in Baltimore, Oct. 21, the Philadelphia, Wilmington & Baltimore Co. filed an answer to the bill of the Baltimore & Ohio Co. on which a temporary injunction was granted Oct. 10. The answer denies that the business of common carrier by railroad, as regulated by law, requires that the roads making connection with each other should interchange their cars, and claims that connection may be maintained by transferring passengers and baggage. It is further claimed that the Baltimore & Ohio cars were carried through over the respondent's road under a written agreement which had its terms terminable by either party upon 30 day's notice, but which had really been terminated on account of the complainant in the case violating the terms of the contract. The Philadelphia, Wilmington & Baltimore Co. further filed an appeal from the injunction to the Court of Appeals, giving the necessary indemnifying bond. This action suspends the injunction until the final determination of the question in the Court of Appeals.

Acting President Garrett has issued a long statement giving the Baltimore & Ohio side of the controversy. He charges bad faith against the Pennsylvania, and claims that not only did that company receive full payment for all work done by it for the Baltimore & Ohio, but that the privileges agreed upon were very grudgingly accorded, and that the Baltimore & Ohio work has been impeded in every possible way, both in Philadelphia and in New York. It is said that President Roberts, of the Pennsylvania, is preparing a statement in reply to Mr. Garrett.

The Baltimore injunction having been removed, orders were given to stop the running of the Baltimore & Ohio trains over the Philadelphia, Wilmington & Baltimore road. Counsel for the Baltimore & Ohio at once made application to the United States Circuit Court in Philadelphia to extend the injunction obtained in that Court against the Pennsylvania to its controlled road. Pending argument on this application, by advice of the Court, the order was withdrawn, and the trains are still running.

Boston, Revere Beach & Lynn.—This company makes the following statement for the year ending Sept. 30:

Gross earnings ($21,620 per mile)	$190 254
Expenses (63.5 per cent.)	120,602
Net earnings ($7,915 per mile)	$69,652
Interest and taxes	$29,885
Dividends, 6 per cent	35,148
	65,033
Surplus	$4,619

The earnings, both gross and net, were the largest ever made by this road. It is of 3 ft. gauge, running from Boston along the sea beach to Lynn, 8.8 miles, and does no freight business, carrying passengers only.

Buffalo, New York & Philadelphia.—An agreement has been filed for record in Buffalo, under which the Fidelity Trust Co. of Philadelphia, trustee under the general mortgage of this company, agrees to give free title to the mortgaged terminal property of the company lying west of the Lackawanna tracks in Buffalo upon the delivery and cancelling of $450,000 of the general mortgage bonds now outstanding. The object of this arrangement is to permit the transfer of the property in question to the Union Terminal Railway Co. of Buffalo free of any incumbrance.

Canadian Pacific.—A contract for the grading and bridging of the branch of this road from Medicine Hat southwest to the coal mines at Belly River, near the Montana line, has been let to Donald Carter, of St. Paul, Minn. The branch will be 117 miles long, and the contract price is $10,000 per mile.

Central Pacific.—This company's statement for August and the eight months to Aug. 31 is as follows:

	August 1884.	August 1883.	Eight months 1884.	Eight months 1883.
Earnings	$2,113,339	$2,267,543	$14,385,503	$15,848,884
Expenses	1,403,335	1,348,631	10,469,496	10,254,779
Net earnings.	$710,004	$918,912	$3,916,007	$5,594,105
P. c. of exps.	66.4	59.5	72.8	64.7

For the eight months the gross earnings decreased $1,463,381, or 9.2 per cent., while the expenses increased $214,717, or 2.1 per cent., the result being a decrease of $1,678,098, or 30.0 per cent., in net earnings. Much of this decrease was due to the wash-outs in California stopping traffic and increasing expenses.

Cincinnati, Indianapolis, St. Louis & Chicago.—This company's statements give the following figures for August and the two months of the fiscal year from July 1 to Aug. 31:

	August. 1884.	August. 1883.	Two months 1884.	Two months 1883.
Earnings	$244,117	$240,517	$453,632	$436,640
Expenses	145,918	142 554	283,474	267,065
Net earnings	$98,199	$103,963	$170,158	$169,575
Fixed charges	50,000	50,083	100,000	100,166
Surplus	$48,199	$53,880	$70,158	$69,409

This shows for the two months an increase in gross earnings of $16,992, or 3.9 per cent.; an increase in net earnings of $583, or 0.3 per cent., and an increase in surplus of $749, or 1.1 per cent. The earnings above shown are from transportation only. Earnings derived from grain elevator, coal elevator, rents, and other miscellaneous sources, are credited at the end of each six months direct to profit and lost account.

Cincinnati, New Orleans & Texas Pacific.—A dispatch from Cincinnati, Oct. 22, says: "A verdict was rendered for the plaintiff yesterday in the suit of the Third National Bank of Urbana against this company to recover money loaned by the bank to the former Secretary of the company, George Doughty, now dead, for which he deposited as collateral certificates of stock of the railway which, since his death, have been shown to be an overissue, without the consent of the directors. This is one of numerous suits involving claims aggregating $300,000, and is the first case to be decided. It will be taken to a higher court."

Cincinnati, Sandusky & Cleveland.—The directors of this company, whose road is leased to the Indiana, Bloomington & Western Co., make the following statement for the year ending June 30 last:

"According to Treasurer's report of June, 30, 1883, we had a balance of cash on hand at that date of $35,471. This and excess earnings subsequently received, together with proceeds derived from sales of Sloane property, made by the trustee during the past year, enabled us to pay, May 1, 1884, cash dividend, No. 2, on the common stock, amounting to $78,137, and also the sum of $30,842 to the trustees of the sinking fund, making a total of $108,979 in addition to the payment of the interest on the entire funded debt of the company, and its current yearly expenses. The outstanding first-mortgage bonds have been reduced, by purchase for the sinking fund, $31,000, during the year ending June 30, 1884, and $17,000 since. The company has no floating debt, unless what it may possibly be adjudged to pay in some old suits, still in litigation. However gratifying this showing may be, in this time of almost universal depression of railroad business, it is not so good as we had hoped for, and not unreasonably expected. The item of $365,818, appearing as profit and loss in the treasurer's report, arises mainly from the dividends made to the holders of common stock Dec. 1, 1882. The item of "I. B. & W. R. R. Co., $156,377," is the increased amount of our claim against that company, under the provisions of its lease. The suit to enforce our claim is still before the Supreme Court of Ohio awaiting its order for trial. The total receipts were $325,047, and the expenditures—interest, dividends, rentals, taxes, etc.—$300,912, leaving a balance on hand of $24,134. The floating assets are $245,463, as against $262,212 last year, a decrease of $16,657, and the floating liabilities $133,356, as against $127,947 last year, an increase of $5,407."

Louisville, New Orleans & Texas.—On account of the encroachment of the river it has become necessary to rebuild some two miles of railroad south of Vicksburg where the line runs close to the river. The new line will require a tunnel of about 1,000 ft. long through a portion of the bluff and will therefore be somewhat expensive to build. The contract for the tunnel has been let to Gorman, Wilson & Lewis, who are to begin work at once.

Manhattan.—The second Sunday (Oct. 19) of the 5-cent fare on the elevated lines in New York showed the following result, as compared with the corresponding Sunday last year:

	Oct. 19, 1884.	Oct. 21, 1883.	Increase.	P. c.
No. of passengers	275,284	142,677	132,607	93.0
Gross earnings	$13,766	$11,308	$2,458	21.8
Expenses	8,500	7,000	1,500	21.3
Net earnings	$5,266	$4,308	$958	22.3

All the lines were operated as on the previous Sunday. It will, however, take a period of several months to decide if the experiment is a financial success.

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of Oct. 11:

The special train on the Mexican Central Railroad to the bull fight at Cuautitlan last Sunday consisted of 11 cars, and 900 tickets were sold. Next Sunday trains will be run on the Mexican National to Cuautitlan and return.

The San Marcos and the Carboniferous railways have been consolidated into one company to be called the Mexican Carboniferous Co., with headquarters in this city (Mexico), and the following board of directors: Delfin Sanchez, President; Manuel Romero Rubio, Manuel Dublan and Francisco Orteaga.

The passenger agents of the Mexican Central, the Atchison, Topeka & Santa Fe, the Missouri Pacific, and the Galveston, Harrisburg & San Antonio railways have issued a joint circular giving special transportation rates for the press, clergy, commercial travelers, and railway employés between this city and various terminal points on their railroads. For members of the press and newspaper correspondents with satisfactory credentials, a rate of $70 will be made between Atchison, Leavenworth and Kansas City to the city of Mexico; and of $75 between St. Louis and the city of Mexico. For regular shippers over these lines and their traveling salesmen, rates for the same distances will be $75 and $80, with 200 pounds of baggage free, tickets limited to 30 days, and stop-over privileges allowed. Special excursion rates will be made for parties of 10 or more.

Missouri River & Northern.—This company has been organized to build a railroad from Valley City, in Barnes County, Dak., on the Northern Pacific road southwest to Pierre, in Hughes County, with a possible extension toward the Black Hills.

Nashville, Chattanooga & St. Louis.—This company's statement for September and the three months of the fiscal year from July 1 to Sept. 30, is as follows:

	September 1884.	September 1883.	Three months 1884.	Three months 1883.
Earnings	$210,585	$197,799	$616,250	$609,925
Expenses	114,897	105,943	339,090	310,019
Net earnings	$95,688	$91,856	$277,160	$299,906
Interest and taxes			171,638	165,691
Surplus			$105,522	$134,215

This shows for the three months an increase in gross earnings of $6,325, or 1.1 per cent.; a decrease in net earnings of $22,746, or 7.6 per cent., and a decrease of $28,693, or 21.4 per cent., in surplus earnings.

New Hampshire Railroads.—The following notes of the first yearly report of the New Hampshire Railroad Commission, under the present law, are taken from advance sheets. The mileage of the roads within the state is 1041 62 the same as last year, and is as large, comparatively, as that of states of greater territorial extent. Every considerable water-power is now accessible by rail. The road-beds of the main lines are in excellent condition, and in this particular the Boston & Maine Co. receives special mention. The passenger and freight equipments of the several roads are fully up to the best standards, and the passenger cars, as a rule, are models of comfort and elegance. The total mileage, as above noted, is 1041.62; the total length of sidings reported and estimated, 203.61 miles, and the total length of double track, 65.09 miles. The total length of track, including double track and sidings, is 1310.32 miles. The mileage of railroads in the state for the last ten years has been as follows: 1874, 939; 1875, 939; 1876, 1001; 1877, 1001; 1878, 1005; 1879, 1005; 1880, 1005; 1881, 1008; 1882, 1011; 1883, 1041.

The total length of horse railroads is 12.68 miles; length of sidings and switches, 0.50 miles; total length measured as single track, 13 18 miles. The mileage since the first year's construction has been as follows: 1878, 2.37; 1880, 7.37; 1882, 12.68. The capital stock of the corporations, owning or operating railroads in the state, is $32,212,840. Making proper deductions for the capital stock expended in other states by the Boston & Maine, the Portland & Rochester, the Nashua, Acton & Boston, and the Worcester, Nashua & Rochester, the capital of the New Hampshire railroads proper would closely approximate $23,000,000. The funded debt of the New Hampshire railroads proper is $8,987,600, and the floating debt (estimated) $1,500,000.

The total earnings of the corporations owning and operating railroads in this state for 1883, were as follows: Passengers, $8,037,876; freight, $9,319,094; other sources, $830,637; total, $18,187,608. The gross expenses were $13,205,034. Net income (including rentals, etc., received), $5,078,691. The gross income of the leading and distinctively New Hampshire railroads, for the past six years, shows a total increase of $1,028,170, or 38.25 per cent. The total increase of net income in the six years was $246,214, or 31.05 per cent. The roads included are the Boston, Concord and Montreal; Cheshire; Concord; Concord & Claremont; Manchester & Lawrence and the Northern.

The expenses of these roads for the six years have averaged 72.58 per cent. of the gross receipts. The operating expenses for the same period have averaged $3,985 per mile. Of 35 corporations making returns for 1883, 25 paid dividends varying from 2.5 to 10 per cent. One paid 2.5 per cent.; four paid 3 per cent.; one paid 4.5 per cent.; nine

paid 6 per cent.; one paid 6.5 per cent.; three paid 7 per cent.; two paid 8 per cent., and three paid 10 per cent. The average was 6.1 per cent. The total amount paid in dividends was $1,842,217, an excess over 1882 of $28,740, and over 1881 of $220,869. During a period of widespread depression in railroad securities the railroads of New Hampshire have shown steadily increasing earnings. The number of New Hampshire stockholders in New Hampshire railroads appears by the returns to be 5,233. The returns of five roads, however, are defective, and the number will be increased by a full report. The amount of stock held in the roads reported is $7,562,020.

The Commissioners commend the encouragement of business along the lines, by extending facilities and offering favorable rates, as the true policy to be pursued by railroads, and the best way in which to subserve their own interests and the business of the state. They also strongly urge the adoption of a safety car-coupler on freight cars which will obviate the necessity of employés going between the cars. During the year 16 persons were killed and 26 injured, and of the fatal casualties only one was a passenger. Owing to the fact that the Board was not appointed until the year had nearly expired for which returns were required to be made, insuperable difficulty was found in carrying out some of the provisions of the law. Another year, however, will remedy what defects may exist in this year's report.

New York Central & Hudson River.—The subscription for the $6,500,000 new debenture bonds has been closed, offers having been received for more than the full amount.

New York, Lake Erie & Western.—This company's new Erie & Wyoming Valley Branch was formally opened for business Oct. 22. It extends from the Honesdale Branch at Hawley, Pa., westward to Pittston, 47 miles. It has been built by the Erie & Wyoming Valley Co., an organization wholly owned and controlled by the New York, Lake Erie & Western Co., and it is to receive, under contract, the entire shipments of the Pennsylvania Coal Co., both east and west. The greater part of those shipments have heretofore been made by the Erie, but the new line avoids the long detour by way of Honesdale, hitherto necessary, and avoids the transfer which has been required at Hawley.

At a meeting of the board in New York, Oct. 16, President Jewett finally retired and Mr. King was chosen in his place. The President, after explaining to the board the details of the operations of the company for the fiscal year ending Sept. 30, 1884, to the extent justified by the present state of the accounts, remarked that he hoped to complete the annual report for the present year at an earlier date than heretofore, and that it would be developed that notwithstanding the almost entire stagnation of business for a portion of the year and the universal low rates of transportation for the entire year, the net earnings, after charging up all the current expenses for maintaining and operating the road, were equal to all the fixed charges of the company, including the interest on the second-consolidated mortgage bonds, less about the sum of $700,000, which, under the circumstances, was, in his opinion, a very favorable result, and better than he had for some time anticipated.

He further remarked that, as there had been some criticism of the wisdom of the lease of the New York, Pennsylvania & Ohio Railroad, he would state that, in addition to the great advantage to the New York, Lake Erie & Western Co. in having the control of that property, he had no doubt that, as a mere question of money, a profit would be realized from the lease whenever business resumed anything like its ordinary and natural condition; that even under the most adverse circumstances which had existed since the lease had been made the loss to the New York, Lake Erie & Western Co. for the entire period of the lease up to Aug. 31, 1884, was but $44,041.

At Cleveland, O., Oct. 18, Judge Baxter sustained the demurrer of the defendants in the suit of James McHenry against the New York, Lake Erie & Western, and the New York Pennsylvania & Ohio companies, to annul the lease of the latter road to the former company. The original and amended bills of complainants are dismissed, because the complainants before filing the same did not make a proper demand for the New York, Pennsylvania & Ohio Co. to institute suitable proceedings and obtain proper relief, as provided for in the 94th rule in Equity prescribed by the United States Supreme Court. The Court further proceeded to show that the mortgages and other indebtedness of the New York, Pennsylvania & Ohio Co. are so great that the complainant's interests as a stockholder in the reorganization scheme are so remote as to not entitle him to any standing in a Court of Equity to demand the relief asked for in these bills.

New York, Ontario & Western.—This company has executed and filed a mortgage to cover an issue of $4,000,000 bonds. The mortgage is to the Mercantile Trust Co. of New York, and the bonds will have 30 years to run. The company have had previously no bonded debt. Of the new bonds $2,000,000 will be used to replace the present preferred stock and the balance to fund the floating debt.

New York, West Shore & Buffalo.—This company has entered fully and very actively into the contest for business which has now been commenced between the lines out of New York, as noted more fully elsewhere. Reports are current, however, that this action is not satisfactory to the bondholders and it is stated that there is a movement among them to put a stop to it. It does not appear that they can do anything at present, as long as the course of the Receivers is approved by the Court.

Norfolk & Western.—This company has just completed an agreement with a syndicate of American and English bankers by which the company is to receive $1,500,000 in exchange for a like amount of adjustment mortgage bonds, maturing in 40 years, and of preferred stock. The stock is that which has been owned and carried in the company's treasury. This will provide the company with an amount sufficient to pay off its floating debt and place it in a strong financial condition. It is stated that the company in its contract with the syndicate has reserved the right to offer the bonds and stock *pro rata* to its shareholders prior to March 1, 1885. The transaction is simply a funding of the floating debt incurred for construction and other purposes and will not increase the interest charges of the company, as the coupons on the new bonds will not be more in amount than the interest on the floating debt.

Northern Pacific.—Tracklaying upon the Jamestown Branch, from New Rockford, Dak., is now in progress and it is anticipated that the road will reach Minnewaukan this fall. The company has no other new branch now in progress in Dakota.

Oregon & California.—The Portland *Oregonian* says: "The Oregon & California Co. having resumed complete control of its road, there is a fair prospect that it will be completed through to its junction with the California & Oregon line. Bids for the work were asked for some time since. Propositions for the completion of the road have been submitted by Messrs. D. P. Thompson and R. M. Steel, the Oregon Construction Co., one to have the work done by Dec. 31, 1885, and another to have it done by Dec. 31, 1886. These propositions have been forwarded to London, where they will be opened on Oct. 15. The bids provide for grading the line from the present terminus to the junction, 30 miles and 4¼ miles of side track, building tunnels and bridges, providing and laying the rails and building stations —in short, placing the road in complete order for the rolling stock and keeping it in order for one year."

Oregon Improvement Co.—This company's statement for August and the nine months of its fiscal year from Dec. 1 to Aug. 31 is as follows, including all departments:

	—August.—		—Nine months.—	
	1884.	1883	1884.	1883.
Earnings	$270,376	$366,706	$2,485,749	$2,901,254
Expenses	223,985	241,462	1,964,155	2,012,738
Net earnings	$46,391	$125,244	$521,594	$888,516

For the nine months the gross earnings show a decrease of $415,505, or 14.7 per cent., and the expenses a decrease of $48,583, or 2.4 per cent., the result being a decrease of $366,922, or 41.3 per cent. in net earnings.

Philadelphia & Reading.—In Philadelphia, Oct. 17, counsel for the Schuylkill Navigation Co. appeared before the United States Court and presented a petition asking for an order directing the Receivers of the Reading Co. to pay the sum of $119,016 as arrearages due under the existing lease of the property of the Navigation Co. The amount now due is made up of a balance of $60,072 for the quarter ending July 1 last, and $158,944, the full amount due for the quarter from July to October. The court referred the matter to the Master, George M. Dallas, to inquire into the matters alleged in the petition and report to the court.

Several reports are current about the directors to be chosen at the annual meeting in January. It is believed that several of the present board will retire and a number of new names are mentioned as their successors. It is reported that Mr. Neilson, who recently declined the position of Vice-President of the company, has been offered the presidency and that he has the offer under consideration.

A statement issued by the Receivers giving the balance sheet up to June 2, 1884, shows the total assets of the company to be $153,736,556, the principal items of which are: Railroad valued at $27,359,979, locomotive engines and cars estimated as worth $10,398,057, real estate worth $8,207,108, and $67,677,530 representing stocks and bonds owned by the company, including $47,737,965 of those issued by the Philadelphia & Reading Coal & Iron Co., and $19,939,564 issued by other companies; other assets of $9,931,979, and $14,119,944 loaned to the Philadelphia & Reading Coal & Iron Co. The $153,736,556 liabilities are made up of items the principal of which are $65,452,081 in mortgage loans, $11,079,200 in debenture and debenture convertible loans, $34,768,375 of capital stock and $7,670,427 of deferred income bonds (at issue price). The total floating debt for which obligations of the company have been given is $12,910,925, other floating debt, $6,556,230. Items not a cash liability make a total of $1,826,132.

The general balance sheet of the Reading Coal & Iron Co. for the six months ending June 1 shows $79,837,231 as the total value of property, including coal lands at an estimated value of $41,296,250, colliery improvements estimated at $7,761,826, and stocks and bonds owned by the company to the amount of $5,745,628. Other items aggregate $3,326,847, the purchases and improvements for 1884 are $1,773,198, and the profit and loss account of the previous years with that of 1884, besides interest account and losses paid, is $9,385,095.

Of $79,837,231 total debt of the company, the principal items are $12,494,000 of divisional coal land mortgage bonds, $823,988 of bonds and mortgages on real estate, $39,737,965 of bonds and mortgages held by the Reading Railroad, $3,544,333 of total floating debt and $14,119,944 of the Reading Railroad's loan account. The bonded debt and interest statement of this company shows $12,494,000 in mortgages, with a total annual interest of of $856,300, $2,049,988 debentures, with an annual interest of $133,114, and $2,600,000 of controlled companies' loans, with annual interest of $176,000, making a grand total of $17,143,988.08 of bonded debt, with annual interest payable, after deducting interest on securities owned by the company, of $1,009,644.

Of the current liabilities of the railroad company June 2, 1884, $12,327,782 was secured by deposits of stocks and bonds to the par value of $36,182,308. This item of $12,327,782 was reduced to $3,071,570 between June 2 and Sept. 30. Whether the sale of the Jersey Central stock, which had been pledged as collateral for a loan from Mr. Vanderbilt, said to have been $2,250,000, had anything to do with this reduction is not stated. The total bonded debt of the railroad company, including bonds which had not been issued, but which have been pledged as collateral for loans, is stated at $114,172,542. The unissued bonds which have been pledged as collateral amount to $19,559,500, as follows: Income mortgage sevens, $7,546,000; adjustment 6 per cent. scrip, $121,000; consolidated fives, first series, $4,782,500; consolidated fives, second series, $7,110,000. The interest on the bonded debt, excluding the unissued bonds pledged as collateral, amounts to $5,475,590.

From June 2 to Sept. 30 the liabilities of the Reading Coal & Iron Co. show a total decrease of $1,404,161, or a total decrease of both companies, as shown by the statement of liabilities of June and September, of $6,461,522. A note affixed to this statement says: "This statement shows the amount of the Philadelphia & Reading Railroad and the Philadelphia & Reading Coal & Iron companies' current liabilities as of June 2, 1884, which has been paid off or liquidated to Sept. 30, 1884, but does not include the sums due by the Receivers for current business for wages, materials, etc., nor to connecting railroads, for which the Receivers have sufficient assets, nor does it include the accruing interest on funded loans not payable until subsequent to June 2, 1884, nor balance of rentals due leased lines since that date."

From a further statement it appears that the fixed charges for the current year are as follows:

Railroad Co.:		
Rent of leased road and canals		$9,600,874
Interest on bonded debt		5,475,590
Interest on floating debt		654,680
Interest on Receiver's certificates		149,716
Liability of guarantees		1,239,071
Total		$17,119,932
Less interest on guarantees paid by debtors, interest on Coal & Iron Co. bonds, and interest on stocks and bonds owned by the company, (heretofore credited to income)		$1,656,318
Total fixed charges of the railroad company		$15,463,613
Coal & Iron Co.:		
Interest on bonded debt	$1,009,644.27	
Interest on floating debt	102,188.30	
Interest on Receiver's obligations	9,286.66	$1,121,119
Total fixed charges of both companies		$16,584,732

Of the amount given as rent of leased railroads and canals, the sum of $5,409,450 is for rental obligations incurred under the New Jersey Central lease,

Pittsburgh & Western.—At a special meeting of the stockholders in Pittsburgh, Oct. 20, the lease of the Pittsburgh, Cleveland & Toledo road by this company was finally ratified. The lease has already taken effect.

Rochester & Pittsburgh.—The committee of second-mortgage bondholders has sent out a circular proposing the following plan of reorganization: The new company is to be called the Buffalo, Rochester & Pittsburgh Railroad Co. Subject to existing liens which are prior to the present second mortgage bonds, the capital stock is to be $15,000,000, of which $5,000,000 is to be 6 per cent. preferred stock, non-cumulative, and $10,000,000 common stock. Of the common stock $5,000,000 is to be distributed *pro rata* among the stockholders of the present company without assessment. The remainder of the common stock and the preferred stock to be sold to present holders of securities, each subscriber to receive one share of preferred and one share of common stock for $60, 10 per cent. payable down and the balance as called for. The plan further provides that no mortgage to secure an issue of bonds or other securities shall be executed unless authorized by the concurrent vote of two-thirds of the preferred stock and a majority of the common stock. The money raised as proposed will be sufficient to pay off the second-mortgage bonds and the floating debt and to place the new company in a satisfactory financial condition.

St. Louis & San Francisco.—It is reported that this company has decided to extend its new Bolivar Branch from Bolivar, Mo., northward to Warsaw, where connection will be made with the Sedalia, Warsaw & Southern road. It is also reported that the San Francisco Co. has bought the Sedalia road and will make it a portion of the branch, changing it from 3 ft. to standard gauge, thus securing a direct route from Springfield to Sedalia. If this report is true, it is altogether likely that the road will be extended from Sedalia northward to a connection with the Chicago & Alton.

Securities on the New York Stock Exchange.—The Governing Committee of the New York Stock Exchange has placed the following securities on the lists:

Burlington, Cedar Rapids & Northern, $1,696,000 additional consolidated first-mortgage and trust bonds.

Louisville & Nashville, $5,000,000 additional stock, making $30,000,000 in all listed.

Northern Pacific, $625,000 additional 6 per cent. general mortgage bonds.

Oregon Railway & Navigation Co., $6,000,000 debenture 7 per cent. bonds, due April, 1887.

Texas & St. Louis.—In the United States Circuit Court in St. Louis, Oct. 18, argument was heard on an application of counsel for the bondholders to rescind the order of the Court directing the payment of accounts for materials and supplies owing from Sept. 1, 1883. Counsel represented that the order was not sufficiently explicit and opened a door to the payment of many claims which would be unjust to the bondholders. The Court reserved its decision but the Judge intimated that the order would not be revoked but would be made more explicit, specifying particularly what claims should be allowed.

Troy & Greenfield.—The Boston *Advertiser* says: "An estimate of the financial operations of the Troy & Greenfield Railroad and Hoosac Tunnel for the 12 months ending Sept. 30, 1884, shows that the tunnel, so far as the state treasury is concerned, has encountered another unprofitable year. For the first nine months of the year the report of the payment for tolls are at hand, and the operating expenses for the entire year are also available. The receipts for tolls for the nine months from Oct. 1, 1883, to June 30, were as follows: Fitchburg Railroad, $146,495; Troy & Boston, $14,473; Boston, Hoosac Tunnel & Western, $19,090; New Haven & Northampton, $13,500; total tolls for nine months, $193,558; operating expenses, $154,870; surplus, $38,688.

"The operating expenses of the road and tunnel for the 12 months from Oct. 1, 1883, to Sept. 30, 1884, were $219,703. In addition to the above operating expenses, there has been expended by the state upon the road and tunnel, for second track and other construction purposes, the sum of $173,800. The previous year the operating expenses amounted to $168,514, and the amount expended for new construction to $285,615. The statement of tolls paid and the surplus of $38,688 as given above refers only to nine months of the year which has just expired. But taking the year as a whole, it is thought to be doubtful if the tolls for these months will equal the operating expenses."

Wabash, St. Louis & Pacific.—In St. Louis, Oct. 13, the special master submitted two reports to the United States Circuit Court. In regard to the interest of the Havana Division bonds; the master recommends that the Receivers be authorized to pay the interest accruing July 1 last on $341,000 of the first-mortgage preferred bonds issued by the old company and also the interest on such of the Havana Division bonds issued by the Wabash Co. as have been exchanged for preferred bonds. The report states that although, owing to the failure of crops, this 131 miles of road have been unproductive to the Wabash for two years past, yet the line is an important factor in the system, to which it should contribute much business in a year of good harvests. It is also useful as being on a direct line to Chicago and as giving the company a loop or second line with easy grades for 40 miles, which would be of great service in times of active business. The second report recommends that the Court authorize the Receivers to purchase 25 heavy freight engines at a price not exceeding $8,300. Fourteen of these locomotives will be purchased from the Baldwin Works and 11 from the New York Locomotive Works. It also recommends that the Receivers be authorized to complete the purchase of 40 box, 40 stock and 20 coal cars. With regard to the payment for this new equipment, it is recommended that it be made partly by the sale of some old rolling stock and partly by the issue of receivers' certificates.

The Receivers have issued in all $2,036,666 certificates for the purpose of taking up the promissory notes on the company secured by the endorsements of Jay Gould, Russel Sage, Solon Humphreys and Sidney Dillon, included in the floating debt, which they were especially authorized to pay.

The Receivers have further petitioned the Court for authority to pay the interest due on certain bonds of the Indianapolis Division, formerly the Indianapolis, Peru & Chicago road. They represent that the earnings of the road have been sufficient during the past six months to pay all the expenses and the interest on the bonds. The Receivers also request authority from the Court to pay money due under a contract made in 1877 by the Wabash Co. for the purchase of a large quantity of rolling stock from Alexander White, as trustee. There remains due on this contract the sum of $112,000 principal and $4,480 as interest, all of which became due July 1st. The interest has been paid and the Receivers now wish to pay off the principal. Another petition filed was one for leave to make the interest on the Receivers' certificates payable semi-annually. They represent that difficulty is found in disposing of the certificates unless such arrangement is made.